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STATE ANXIETY AND ATHLETIC COMPETITION

by

PETER KLAVORA

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

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DEDICATION

This work is dedicated to Tatjana who patiently and
unselfishly encouraged me, in her own way,
through all these years
of my graduate career.

ABSTRACT

It was proposed to regard athletic competition as a set of stressor stimuli which evoke psychological and physical threats to competing athletes, thus creating Pre-Competitive Anxiety. A theoretical framework for Pre-Competitive Anxiety within Spielberger's State-Trait Anxiety Theory was then developed. On the basis of this theoretical conceptualization of athletic Pre-Competitive Anxiety within Spielberger's theoretical model of State-Trait anxiety, a series of hypotheses were generated and subsequently tested to provide a better understanding of this pervasive phenomenon in athletic competition.

Furthermore, a thorough theoretical examination of the relationships between Pre-Competitive Anxiety and athletic performance was carried out and expanded. A link between Customary Level of Pre-Competitive Anxiety and Customary Level of Performance for performing athletes was theoretically established on the basis of Duffy's activation theory. Customary Level of Pre-Competitive Anxiety as demonstrated in athletes was then related to Spielberger's State anxiety phenomenon.

Several hundred athletes on different levels of competition across different sports were repeatedly administered a State anxiety inventory under two different

experimental conditions: stressful (prior to game time) and non-stressful (practice). After every game, the performance of each experimental subject was evaluated and recorded. Changes in State anxiety scores were then studied as a function of eight independent variables of the study.

When the relationship between State anxiety and Performance in Senior High School Basketball was studied for Ss who differed on Trait anxiety, and Overall Competitive Mean State anxiety, two separate, similar in shape, but qualitatively different bell-shaped curves emerged which were allocated at different levels on the A-State scale continuum.

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Special acknowledgement is due the head coaches of the teams participating in this research. The eight months long investigation (from September 1973 to April 1974) required extensive cooperation on their part and by providing it, they demonstrated their open-mindedness and a recognition of the need for improved coaching by the aid of systematic research. Although the cooperation and help received from assistant coaches, managers, team captains, and individual players is deeply appreciated, only the names of head coaches will be listed here. Football: J. G. Donlevy, I. Chemelyk, D. MacCaffery, D. Rippel, B. Anderson, J. Belmond, K. Brice, J. Melicher, E. Oberle, B. Laforge, L. Dufresne, D. Turlock.

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I. INTRODUCTION

Emotion is probably one of the most difficult of psychological phenomena to define and study, particularly when such study is attempted in the midst of life situation. It was best defined by Spielberger (1972) as a phenomenon that has both phenomenological and physiological properties and refers to complex, qualitatively different feelings, states or conditions of the athlete's organism when in anticipation of competition. While phenomenological aspects of emotion have distinctive features depending on the stressful situation and are commonly known as fear, rage, anger, boredom, apprehension, physiological aspects of emotion, on the contrary, display similar physiological reactions as changes in heart rate, changes in respiration rate, changes in blood pressure, and are primarily regulated through the autonomic nervous system.

Although many phases of competitive athletics have been subjected to careful scientific investigation, very little has been done along the lines of systematic exploration of the emotional aspects of such competition - in spite of the fact that importance of psychological fitness for optimal performance has been recognized by sport psychologists, all participants of athletic competition, and coaches alike. The present study is designed to explore pre-competitive anxiety and will throughout the study refer to the phenomenological properties of the emotional aspects of athletic competition

as experienced by athletes before an athletic contest.

Many different connotations have been used in the literature and texts in sport psychology regarding the emotions of athletes in pre-competitive situations. Some of the most used terms refer to phenomenological aspects of this pre-start phenomenon as nervousness, motivation, anxiety, being up, and psychological stress whereas others refer to such physiological properties as activation, arousal, emotional arousal, and tension. The diversity of theoretical orientation regarding the phenomenon obviously reflects differences in the professional training, experience, and research goals of all those interested in this phenomenon. Therefore, it is not surprising to find considerable semantic confusion and equivocal research results in the literature of sport psychology. This state of affairs is due, in part, to the failure to distinguish between situational anxiety and anxiety proneness, and in part to the lack of in-depth examination of particular stressful situations. This new conceptualization of anxiety by Spielberger may be useful in the systematic examination of the conditions and events (in this study, athletic competition) that are anxiety provoking and it will be examined in greater detail in the following sections. The relevant literature will be reviewed next, to be followed by an attempt at the conceptualization of pre-competitive anxiety within a State-Trait Anxiety Theory. Since the research hypotheses of the study are derived from the theory, they are stated at the appropriate

points after the theory has been formulated. The chapter is concluded by a thorough theoretical examination of the relationships between pre-competitive anxiety and athletic performance and by a statement of the problem.

CURRENT VIEWS ON ANXIETY

Research findings on anxiety have not led to convergence among anxiety theories and there is as yet no comprehensive theory that is widely accepted (Spielberger, 1966). After reviewing several hundred studies related to anxiety, Cattell and Scheier (1961) located more than 300 proposed definitions of the anxiety construct. However, it was noted that almost all writers agreed that there is a common core of meaning to the construct of anxiety, and that the state of anxiety is not a pleasant one. This meaning is closest to Freud's definition of anxiety as "something felt", an unpleasant affective state or condition of human organism. It is a signal indicating the presence of a threatening or dangerous situation (Freud, 1933: 119). More specifically, an anxiety state was defined by: 1. "a specific unpleasurable quality", 2. "efferent or discharge phenomena", and 3. "the perception of these" (Freud, 1936: 70). This conception of anxiety, with both phenomenological and physiological components, is reflected in the theoretical work and empirical findings of such contemporary personality theorists as Arnold (1960), Lazarus et al (1952), and Schachter (1964).

The most current views of anxiety as a construct distinguish between situational anxiety and anxiety proneness. This important distinction has been delineated by Cattell and Scheier (1961), Lazarus (1966), and Levitt (1967). These psychologists defined anxiety proneness as a relatively unfluctuating condition of an individual which exerts a constant influence on his behavior whereas situational anxiety is a transitory state which is ephemeral, occurs in response to a stimulus and is likely to vary in intensity as a function of the stimulus, and is characterized by a variety of associated physiological reactions.

Spielberger's State-Trait Anxiety Hypothesis

In an attempt to integrate Cattell and Scheier's concepts of anxiety with the phenomenological-physiological conception of anxiety advanced by Freud and others, Spielberger (1966a, 1972) has recently proposed a State-Trait Theory of Anxiety. Two different anxiety constructs are defined as State anxiety (A-State) and Trait anxiety (A-Trait). A-State is conceptualized by Spielberger (1972: 39) as "a transitory emotional state or condition of the human organism that varies in intensity and fluctuates over time. This condition is characterized by subjective, consciously perceived feelings of tension and apprehension, and activation of the autonomic nervous system". Furthermore, the level of A-State will be determined by circumstances that are perceived by an individual to be threatening, irrespective of the objective danger. A-State will be low

in non-stressful and non-threatening circumstances in which an existing danger is not perceived as threatening.

A-Trait, on the other hand, "refers to relatively stable individual differences in anxiety proneness" (Spielberger, 1972: 39), i.e., the disposition to respond with A-State in situations which are appraised by the individual as threatening.

In Spielberger's conception of anxiety, A-State is characterized primarily by the intensity of anxiety as an emotional state at a particular moment in time whereas A-Trait is characterized primarily by the frequency with which an individual experiences anxiety states. High A-Trait individuals tend to perceive a larger number of situations as dangerous or threatening than low A-Trait individuals.

Furthermore, the characteristics of stressor stimuli that evoke differential levels of A-State in persons are given special consideration in Spielberger's State-Trait Anxiety Theory. This is discussed after a review of relevant literature.

REVIEW OF RELEVANT LITERATURE

Introduction

While there is very little literature which bears directly upon this study, there are some points of view extant which do bear directly upon it. A review of these will be made first and will be followed by some of the unequivocal conclusions that texts in sport psychology

either state or imply concerning the relationship between pre-competitive anxiety of athletes and their performance. The section is concluded by a brief discussion of the main orientation of theoretical psychologists regarding the anxiety - performance relationship.

Review

Lampman (1966) investigated the relationship between anxiety level at certain stages of competition as measured by the IPAT-8 Parallel Form Anxiety Battery Test and its effect on athletic performance. Objective (the percent of improvement in time from a base time in a particular event) and subjective (coaches' subjective evaluation of individual performance) performance measures were repeatedly obtained after each swimming meet throughout the competitive season along with pre-meet anxiety responses of varsity swimmers at the University of Florida. The anxiety instrument was administered to the athletes approximately one hour before competition. The most important conclusions of the study were: 1. an increase in anxiety from the non-competitive situation facilitates performance as measured by the coaches' evaluation; 2. champion and non-champion swimmers do not differ significantly in regards to anxiety level and performance; 3. low anxious athletes perform better if their pre-meet anxiety is low; and 4. high anxious athletes perform better if their pre-meet anxiety is high.

The effect of emotional stress on high school track and field performance was investigated by Miller (1960)

on the basis of six track meets. Emotional stress of the athletes before competition was repeatedly measured with the aid of a confidence rating check list containing adjectives related to athletes' feelings at the time of competition. The performance was subjectively evaluated by the coaches and the investigator in terms of outstanding, average or poor competitor. The change in the pre-meet confidence ratings from their base line values obtained in non-competitive environment along with the changes in other physiological measures that were also taken were treated statistically for the three classes of performers. A significant relationship between emotional stress and performance was found. Another observation was that emotional stimulation, while beneficial to a certain point, has a threshold above which the result is less efficient performance. The athletes classified as poor competitors did not experience as much stress at any time as the average and outstanding competitors. From physiological measures only palm perspiration measures showed a significant change from a non-competitive situation. Other physiological measures were respiration and pulse rate.

In a study by Carder (1965), the primary purpose of the investigation was the relationship between anxiety scores of freshman football players and their level of football performance as determined by coaches' evaluation on four different football skill tests and their total performance as observed by the coaches throughout the entire football season.

The testing environment was competitive to the extent that the players competed against each other on such skills as blocking, tackling, movement agility, and running speed. The central hypothesis tested in this study was the greater a subject's anxiety or drive level, the higher will be the level of his football performance. The results, however, indicated no significant relationship between the anxiety scores as measured by the Taylor Manifest Anxiety Scale (TMAS) and total football performance (as defined in the study) and individual skill performance on selected football skills.

Knapp (1960) in an attempt to determine the emotional reactions of college women gymnasts as a function of time to gymnastic competition obtained separate self-appraisals of approach and avoidance conflict measures along with several physiological measures (galvanic skin response, pulse rate, and reaction time). The physiological measures were administered on a control day (non-competitive day), the day before a meet and the day of a meet. The two psychological scales were administered only once after the meet. However, the subjects rated themselves in terms of their feelings of approach and avoidance at 14 different time periods leading up to, during, and just after a gymnastic meet. The results showed that the psychological measures did show variations with time whereas at no time did the analysis of variance on the physiological tests show days of testing to be significant. However, both

types of measures showed the gymnasts to be under stress as related to the gymnastic meet. The novice gymnasts apparently were under more stress than were the middle and experienced groups, since they were found to be the most reactive group.

An experiment by Ginn (1954) was designed to determine physiological emotional response patterns that may be associated with the pre-competitive situation. A group of college athletes from three different sports (swimming, basketball, and track and field) were given a battery of eight physiological tests twice: once in a non-competitive situation and again on a day of an athletic competition. Statistical analysis for the entire group of the differences between the non- and the pre-competitive tests did not reveal any large differences, nor did it establish any one measure as superior in its validity to show emotional change. However, of the 16 subjects, 11 experienced feelings of tension and excitement as stated on a questionnaire administered to them prior to the contest.

In explaining the relationship of emotion as measured by a test battery of physiological and psychological measures and competitive physical activities, Johnson (1949) made the following five observations on selected college football players and wrestlers in connection with each contest: six days in advance of the contest, the day before, a few hours and immediately before the contest. The fifth test was

administered after the contest. All physiological parameters (blood pressure, blood sugar, heart rate) revealed appreciable rise immediately prior to the contest from their levels observed in earlier testings. Wrestlers as a group experienced greater changes in all physiological parameters than did football players. All athletes became nervous, tense and anxious just before game time. However, wrestlers reported their "nervous anticipation" much earlier than the football players whose anxiety was marked with greater intensity. "In general," concluded Johnson, "subjective emotional reactions are seen to be consistent with the objective results . . . when a man reported himself to be 'extremely nervous', it was possible to observe something of how and to what extent this intense feeling was manifesting itself physically" (1949: 76). The psychological inventory used in the study was "a simple scale, showing their approximate degree of tension or anxiety" (Johnson, 1949: 73). The test was given often up to within seconds of actual competition.

In a later, similar study, Johnson and Harmon (1952) employed only physiological measures to investigate pre-contest phenomena in athletes. Football players were repeatedly tested prior to every game throughout the season. The authors found that emotional reactions prior to a football contest were of significant intensity to be measured by three of the four physiological indicators selected: galvanic skin response, pulse rate, and systolic blood

pressure. Analysis of the data on individual performance indicated that team reactions reflected most nearly the reactions of the individuals who played in the game regularly, i.e., starters. A close relationship was found to exist between the coaches' pre-season estimate of the importance of the games and the measured team reactions. In the light of this relationship, the authors stated the hypothesis that emotional reactivity goes with "upness" for football competition since the football team was observed (on the basis of measured physiological indices) to be "up" or "down" before every contest.

In still another study, Johnson (1951) found athletes (college swimmers, wrestlers, basketball players and hockey players) as a group, when under competitive stress, to be significantly more reactive to the two psychological tests devised by the author than were the controls who were under no known emotional stress. The athletes were given two word association tests within one hour of competition and their reactivity was measured by a psychogalvanometer of the Wheatstone Bridge type. One of the tests contained words that were critical to a specific sport and the other had psychosexual critical words. The controls were not given the sports word test as it could hardly be expected to have any significance to them. The author's conclusions were that "the pre-contest situation in the sports represented was evidently characterized by a tendency toward exaggerated psychogalvanic reactivity" on the part of the participants

since the athletes as a group reacted vigorously to both the psychosexual and sports critical words. Outstanding performers (as defined by their coaches) never reacted in an extreme manner. Contrary to expectation, the author found basketball players to be more reactive than the other athletes. In previous research by Johnson (1948) the wrestlers were characterized by the greatest emotional disturbance.

From the foregoing review of the literature it is evident that competitive situations in athletics evoke specific psychological states, which in turn are accompanied by autonomic changes in the physiological states of athletes. Both states were measured with lesser or greater success by different instruments and methods. Although there seems to be a greater agreement in the methodology of physiological measurement, it was nevertheless less successful than psychological measurement where the diversity of the instruments used to measure pre-competitive phenomena, and its definition, varied from study to study. Despite this methodological diversification, it is obvious that all researchers were attempting to identify a psychological phenomenon innerly experienced by most athletes as feelings of tension, uneasiness, apprehension, fears and anxiety which are accompanied by such typical physiological changes as pulse and respiration rate changes, blood pressure changes, galvanic skin response changes. This psychological pre-start phenomenon is termed in this study as pre-competitive

anxiety and will be operationally defined at a later stage.

If on one hand, certain psychological and physiological measures have been successfully identified as being sensitive to changes in the psychological and physiological states of athletes from a non-competitive level to a pre-competitive level, the reviewed research, on the other hand, makes only a vague attempt to determine the possible effect that pre-competitive anxiety might in turn exert upon the actual performance of the athletes in the upcoming contest. Only three studies dealt with this problem. Lampman's (1967) and Miller's (1960) research is important in this regard although their findings have to be considered somewhat cautiously since both studies have serious methodological deficiencies regarding the measurement of pre-competitive anxiety in athletes. This also has been pointed out by Martens (1971) in his thorough review of the literature related to this problem. Lampman was assessing pre-competitive anxiety, in itself a State anxiety construct as earlier defined by Spielberger, with an inventory devised for measuring Trait anxiety, whereas Miller used a self-constructed confidence rating scale that might have only marginally assessed the phenomenon. In the third study, Carder (1965) did not reveal any significant relationship between anxiety level and athletic performance.

Unequivocal Generalizations Regarding the Anxiety - Performance Relationship in Athletics

Despite the fact that the problem of the influence of pre-competitive anxiety upon performance in the context of

athletic competition has not been sufficiently investigated, the leading sport psychologists unequivocally suggest this relationship to be an established fact. Singer (1972) believes that a certain amount of anxiety acts to prepare the athlete for competition whereas "in competition, athletes who score extremely high or low in anxiety should be placed in situations which will allow them to perform the types of skills best suited to their temperament" (1972: 126). Also, Singer expects the highly anxious athletes to perform worse under stress than less anxious athletes when the task is complex. In relatively uncomplicated skills, involving primarily strength and endurance, an extremely anxious state serves more productive ends than a less anxious state.

Similar unequivocal generalizations are typically made by other leading sport psychologists, Tutko (1971), Cratty (1973a, 1973b), and Oxedine (1970), regarding the pre-competitive phenomenon. Cratty states that "individuals at the extremes of an anxiety scale will not perform well" (1973a: 188). Furthermore, ". . . all anxiety is not disruptive. An optimum level seems to be needed to perform well. On the other hand, if the athlete is too anxious or projects an 'I don't give a damn' attitude, performance is likely to be less than desirable" (1973a: 190). Oxedine (1970: 29) provides a summary of suggestions regarding the optimal arousal[1] for the typical participant in a variety of sports activities. It is shown in Figure 1.

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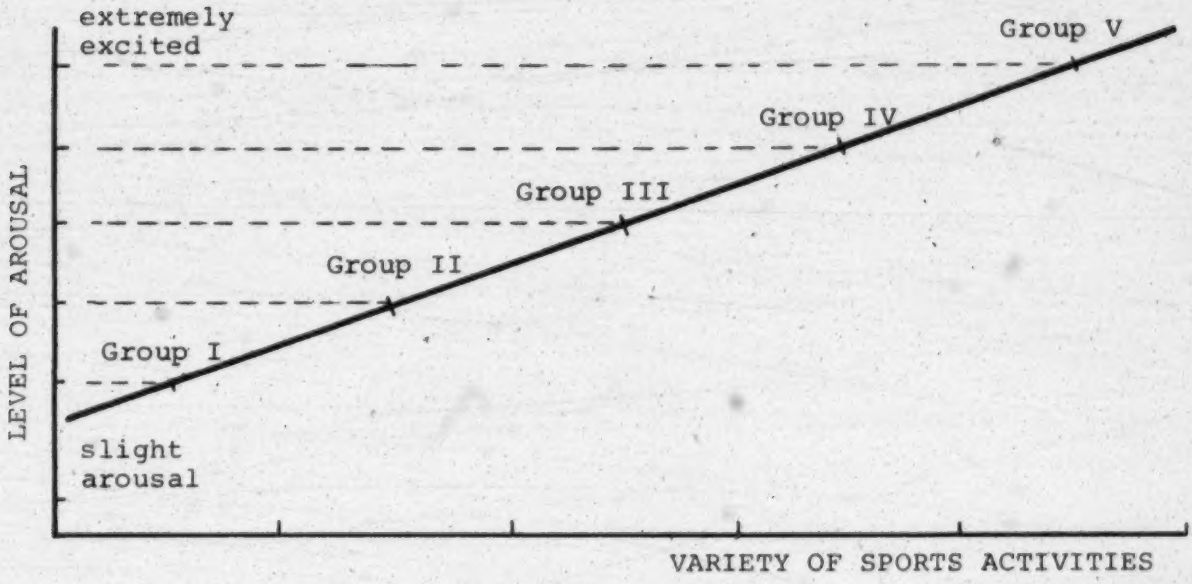
[1]Oxedine defines arousal in terms of physiological conditions

FIGURE 1

OPTIMUM AROUSAL LEVEL FOR SOME TYPICAL SPORTS SKILLS (OXEDINE, 1970: 29)



archery and bowling; basketball free throw; field goal kicking; figure skating; golf putting;	baseball pitchers; fancy dives; fencing; football quarter-back; tennis;	basketball skills; boxing; high jumping; soccer skills; gymnastics;	running long jump; running short and long; races; shot putt; swimming; wrestling; judo;	football blocking tackling; weight-lifting; sit up; push up;

Major Theoretical Orientations Regarding the Anxiety - Performance Relationship

Evidently, sport psychologists have based their unequivocal statements on extensive research evidence and

---

of the athlete in which his "'normal' physiological functions have been intensified" (1970: 24). This physiological state refers very closely to its psychological counterpart of the total pre-competitive disruptive state that athletes find themselves in when under stress of competition.

scientific literature concerning the effects of anxiety upon such things as verbal performance, visual discrimination, reaction time, maze learning, simple motor tasks, manipulation tasks, steadiness, memory tasks, and other similar tasks. This research has attempted to explain the effect of anxiety upon performance in terms of Duffy's (1962) arousal or activation theory that predicts a nonmonotonic or inverted U relationship between the two. The theory thus assumes an optimal physiological activation of the organism for optimal performance. The more one's physiological activation varies either way around this optimal point, the more performance decreases.

Much of this experimental research has been in turn based on drive theory as formulated by Hull and Spence that predicts only a linear relationship between anxiety and performance. Along this line of thinking it is assumed that individuals vary in the magnitude of drive which according to Taylor (1953) is directly related to Trait anxiety and thus it is measurable by Trait anxiety scales. According to this theory, performance either increases or decreases as the subject's anxiety increases, depending on the complexity of the task, the degree of stress which the subject operates under, and whether or not he is performing a learned or unlearned task.

Typically, for this type of research, subjects are divided into high anxious and low anxious groups on the basis of a Trait anxiety scale and then perform a simple motor task

(or other tasks mentioned above) under identical conditions (stressful or non-stressful) in which the dependent variable is either the number of errors, correct responses, or time. Further, anxiety is artifically created and the anxiety stimulus is removed from the task. The problems of this type of research are well discussed by Duffy (1962), Martens (1971), and Levitt (1967).

In a review covering over 30 studies, concerning research of the relationship between anxiety and motor behavior, Martens (1971) found the literature to be inconsistent and contradictory concerning the effects of Trait anxiety on motor performance in the presence or absence of a stressor. Therefore, he stated ". . . it is not difficult to recommend that drive theory be abandoned and that other theoretical approaches be considered. One such alternative is arousal or activation theory and the inverted U hypothesis" (1971: 167).

Although Martens (1971) found some evidence which supports the inverted U postulation, the evidence was far from conclusive. There was a lack of success in finding consistent differences when testing only low and high anxiety groups. Namely, it was assumed that low and high anxious subjects perform very similarly (i.e., badly as compared to other groups) because they operate on the low portions of the inverted U performance curve. Low anxious subjects are found low on the left whereas high anxious subjects are found low on the right of the inflection point of this curve. While Martens reports the related literature as equivocal, sport psychologists suggest this relationship to be an

established, unrefutable law. This inevitably implies the exclusion of low and high anxious subjects from participation in performance tasks because they apparently operate at an anxiety level which is at variance with the anxiety level (i.e., optimal anxiety level) required for optimal execution of the motor task under consideration. Martens noted that ". . . it is somewhat remarkable that the inverted U concept has been such a popular concept to explain the relationship between anxiety, arousal, and motor performance, but that it has received minimal experimental attention" (1971: 169). Among leading sport psychologists only Alderman expresses concern regarding the effect of anxiety upon performance in athletics.

> "It is thus evident that the information on anxiety level, performance, and competition conditions is far from clear. Considerable research still needs to be done" (1974: 102).

The following summary conclusions could be made from the foregoing discussion: a. Athletic competition is a stressful, pre-competitive anxiety creating situation. b. The research on the effect of anxiety on athletic performance is negligible. c. Generalizations made about the effect of anxiety on athletic performance by most sport psychologists have been mostly inferred from related research. d. Methods used in studying anxiety are not adequate because of the following reasons: (i) only Trait anxiety is considered; (ii) laboratory-created stress conditions do not approximate the stressful states produced by highly competitive situations in athletics; (iii) only

single samplings of the psychological condition of an individual were obtained rather than repeated samplings over an extended period of time; and (iv) inadequacy of the inventories used[1].

THE CONCEPTUALIZATION OF ATHLETIC PRE-COMPETITIVE ANXIETY WITHIN A STATE-TRATE ANXIETY THEORY

As we have already seen, Spielberger attempted to integrate Cattell and Scheier's concept of anxiety with the phenomenological - physiological conception of anxiety as advanced by others and proposed a State-Trait Anxiety Theory. In Spielberger's framework of anxiety, stressor stimuli that evoke differential levels of A-State in persons are given special consideration. On the basis of his research, Spielberger (1962, 1966, 1966b) observed that persons who are high A-Trait are particularly threatened in situations which pose direct or implied threats to self-esteem. Since these individuals were described as more self-deprecatory, and as persons who fear failure, it might be expected that they will manifest higher levels of A-State in situations that involve psychological threats to self-esteem rather than physical danger. This notion has been subsequently confirmed by others (Hodges, 1967; Lamb, 1969).

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[1]For other reviews of the research inadequacies concerning anxiety - performance relationship, the reader is referred to Duffy (1962), Levitt (1967), and Martens (1971).

Basowitz et al (1955), in studying soldiers undergoing paratroop training, noted that higher levels of A-State were evoked by the anticipation of failure than by fear of serious injury or death. Therefore, Basowitz distinguished between harm anxiety and shame anxiety. Mandler and Sarason (1952) and Sarason et al (1960) studied test anxiety elicited by test performance in an ordinary classroom evaluation situation. Mandler and Sarason believed that the study of anxiety should begin with examination in-depth of the particular stressful situation. They said that although it would be virtually impossible to study all stressful situations, one could be guided by implicit reasoning that, for example, we live in an achievement-oriented society in which great emphasis is placed on successful performance from an early age. Not performing up to a standard and not accomplishing is regarded as highly undesirable in our culture and creates anxiety. Test anxiety was regarded as a "near-universal" experience in our test-conscious culture. The findings from this earlier research are thus consistent with Spielberger's hypothesis that psychological threats and physical dangers may potentially be considered as two quite different causes of anxiety.

It is proposed here to regard athletic competition as a set of stressor stimuli which evoke psychological and physical threats to athletes, thus creating pre-competitive anxiety. These threats have a specific athletic competition quality and are a function of the nature of the sport. If one penetrates below the surface of athletic crises to dis-

cover their psychological causes, one runs athwart the problem of pre-competitive anxiety at almost every turn. An athlete operating in an athletic competition milieu is a person under stress, who is influenced in both obvious and subtle ways by the social and physical context in which he performs. There is reason to believe that the ordinary stresses and strains experienced by athletes at almost all levels of competition are such that few athletes, if any, escape the need to confront pre-competitive anxiety and to deal with it in some manner. The literature reviewed indicated that there are differences in the emotional states (phenomenological and physiological) of athletes when in non-competitive and competitive athletic environments.

The feelings of apprehension which are experienced by the athlete when engaged in athletic competition, along with the observable behavior generally associated with such feelings, have been labelled in several ways by athletes and sport psychologists. Fears, like fear of failure, fear of audience, fear of injury, fear of death[1], emotional stresses, nervousness, tensions, worries of one's performance, as usually accompanied by tight muscles, shakiness, dry mouth, indigestion, are some of the most popular terms used in expressing their feelings before an athletic contest. These feelings of apprehension experienced by athletes fit into Spielberger's theoretical framework since some emotional

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[1] e.g., in car racing, ski jumping, and parachuting.

feelings (fear of failure) are obviously psychological threats whereas others pose physical danger to the athlete (fear of injury). In order to generate a series of hypotheses, for the purposes of the present thesis, it seems reasonable to suggest that, following the State-Trait Anxiety Theory, it is possible to conceptualize competition anxiety in two ways: anxiety experienced before and during an athletic competition (competition A-State) and individual differences in the disposition to experience A-State in athletic competition (competition A-Trait). Competition A-State may be defined as a transitory anxiety experienced by athletes before and during athletic competition which is subjectively characterized and consciously perceived by feelings of tension, apprehension, and activation of the autonomic nervous system. In this study, competition A-State is used throughout as pre-competitive or pre-start anxiety. Competition A-Trait, on the other hand, refers to relatively stable individual differences in the disposition or tendency to respond with elevations in A-State in a particular competitive situation.

According to Spielberger (1972) and McAdoo (1970), the appraisal of a particular stimulus or situation as threatening is also influenced by a person's abilities and past experience, as well as by his level of A-Trait and the objective danger that is inherent in the situation. Often encountered stressful stimuli may lead an individual to develop effective coping responses that may reduce the level of A-State intensity. This would, of course, depend on how

well an individual's defense processes develop as a function of the frequency of the threatening situations an individual is in.

It is thus possible to conceive a high A-Trait athlete not threatened by an intensely stressful competition because he has the requisite skills and experience to deal with this particular situation. On the other hand, a low A-Trait athlete may be threatened by a contest that most athletes find non-threatening because of its special traumatic significance for him. "Thus, while measures of A-Trait provide useful information regarding the probability that high levels of A-State will be aroused, the impact of any given situation on the intensity of A-State can only be ascertained by taking actual measurements of A-State in that situation" (McAdoo, 1970: 9).

On the basis of the above theoretical conceptualization of athletic pre-competitive anxiety within Spielberger's theoretical model of State-Trait Anxiety, nine hypotheses have been derived, and, where necessary, the rationale for the hypotheses has been given.

Hypothesis 1: That athletic competition evokes pre-competitive anxiety in all participants. This transitory A-State is significantly higher than A-State experienced by the same athletes in non-competitive situations.

Hypothesis 2: That athletes who differ in A-Trait show corresponding differences in A-State when in similar non-competitive situations.

Hypothesis 3: That athletes who differ in A-Trait show corresponding differences in pre-competitive anxiety when in similar athletic competitive situations. More specifically, athletes

who are high on A-Trait will show higher pre-competitive anxiety than athletes who are low on A-Trait when in similar athletic competitive situations.

Hypothesis 4: That athletes who differ in skill (starters, non-starters) show corresponding differences in pre-competitive anxiety in similar athletic competitive situations.
Rationale: The responsibility of winning or losing lies predominantly on starters of the respective team. Thus, the psychological threat of losing is greater to starters than to non-starters.

Hypothesis 5: That athletes at higher levels of competition experience less pre-competitive anxiety than athletes at lower levels of competition.
Rationale: It is assumed that athletes at higher levels of competition are more experienced and have developed effective coping responses to reduce the intensity level of pre-competitive anxiety.

Hypothesis 6: That athletes in individual sports experience higher levels of pre-competitive anxiety than team sports participants.
Rationale: In team sports the responsibility of winning or losing is spread among all team members. Thus, the psychological threat of losing to individual members of the team is lessened.

Hypothesis 7: That non-controlled aggressive sports (hockey, wrestling, football), controlled aggressive sports (basketball, fencing) and non aggressive sports (volleyball, gymnastics, cross-country skiing) evoke similar pre-competitive anxiety in athletes who differ in Trait anxiety.
Rationale: According to Spielberger, physical threats do not elicit different levels of State anxiety for persons who differ in Trait anxiety.

Hypothesis 8: That athletes who differ in injury history experience similar pre-competitive anxiety.

Hypothesis 9: That previously injured athletes who differ in Trait anxiety experience similar pre-competitive anxiety.
Rationale: An injury is considered a physical danger to the individual and, as such, according to Spielberger, does not elicit different levels of State anxiety.

CUSTOMARY LEVEL OF PRE-COMPETITIVE ANXIETY: ADDITIONAL CONSIDERATION

Several leading sport psychologists, Cratty, Singer, Oxedine, have claimed that optimal performances on different tasks are associated with different levels of pre-competitive anxiety. Furthermore, the underlying assumption of Cratty's statement, as quoted on page 14, is obviously the inverted U hypothesis of activation shown in Figure 2. Easterbrook (1959) contends that a performer with low drive[1] utilizes task-relevant and task-irrelevant cues in performing a particular task. Since the number of irrelevant cues is quite high, the resulting performance is usually poor (P_1 on the curve in Figure 2). As the drive of the performer increases, the range of cue utilization decreases with irrelevant cues disappearing first. Thus, performance improves until it reaches an average or expected performance (A_1 in Figure 2). At point O (Figure 2), all irrelevant cues are eliminated and task relevant cues are emphasized to produce an outstanding performance. According to Easterbrook, if cue elimination is continued past point O, the deterioration of the performance takes place (points A_2 and P_2) because now task relevant cues (all necessary for adequate performance) are being reduced.

Theoretically, a basketball player's performance in a game situation may be placed on a continuum from very bad

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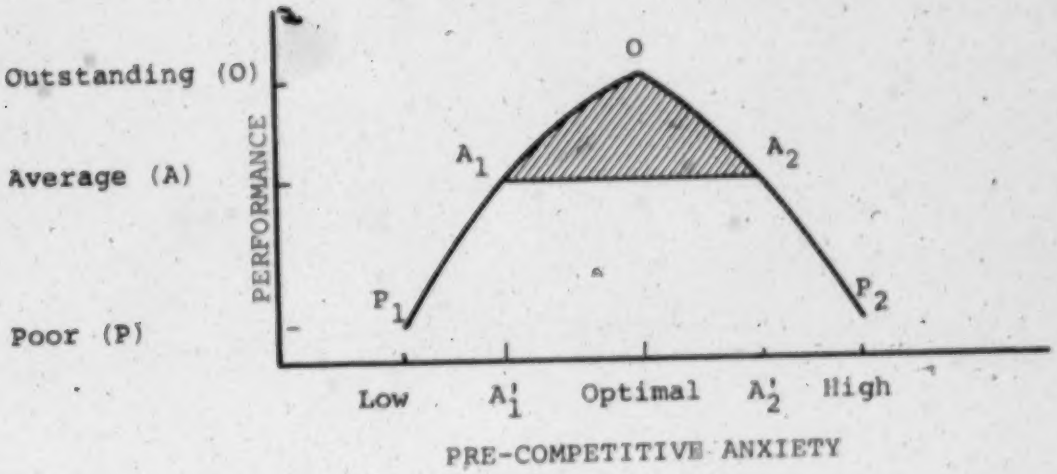
[1] This term as used by Easterbrook refers to emotional arousal which is related to a physiological counterpart of the phenomenological pre-competitive phenomena examined in this study.

FIGURE 2

RELATIONSHIP BETWEEN CUSTOMARY PRE-COMPETITIVE LEVEL OF ANXIETY AND CUSTOMARY LEVEL OF PERFORMANCE



play to an "extraordinary" play as follows: poor performance (P), customary or average or expected performance (A), and exceptionally good or outstanding performance (O). From experience we know that even though a poor performance is not desirable, the player occasionally does play poorly (P_1 and P_2 on the curve) and yet on other occasions he performs brilliantly (O on the curve). Most often, however, he is playing up to his potential as is expected of him by the coach (A_1 and A_2 on the curve).

If the relationship between the pre-competitive anxiety and performance is as strong as it is claimed to be, and providing there is an appropriate instrument available to identify this part of the pre-start phenomenon, then each point on the performance curve should become associated with

an anxiety score on the horizontal axis as shown in Figure 2. Outstanding performance (O) in Figure 2 is associated with only one anxiety score whereas the other two performance levels are associated with two anxiety scores each. Poor performance (at P_1 and P_2), for example, is associated with a low and a high level of pre-start anxiety. Both levels impair the performance, however, for two quite different reasons as has been explained above with the cue utilization theory.

Even though a poor performance by a basketball player in a game situation is theoretically quite possible and in fact occurs, it had better be a rare occurence during the entire season if the player is to stay on the team. This, of course, is determined by the winning emphasis in athletic competition. His performance in this kind of situation, when consistently above a poor level on either side of the curve (i.e., at A_1, A_2 or O), for the purposes of this study, will be referred to as the Customary Level of Performance. Because of the relationship between pre-competitive anxiety and performance, the Customary Level of Performance can be hypothesized as being associated with the Customary Level of Pre-Competitive Anxiety which could be seen as being similar to Spielberger's State anxiety phenomenon.

According to Spielberger, the intensity of State anxiety is a function of two things: 1. Trait anxiety, i.e., a predisposition to anxiety, and 2. the nature of the stressful stimuli. High Trait anxiety athletes would, according to this theory, experience a more intensive Customary Level

of Pre-Competitive Anxiety than low Trait anxiety athletes, the higher intensity reflecting itself in a presumably significantly higher score as measured by a State anxiety inventory. This proposition would not affect the inverted U hypothesis of the relationships between Customary Level of Performance and Customary Level of Pre-Competitive Anxiety, but would rather allocate it to a different level on a continuum between the lowest and the highest possible values as scored on a State anxiety inventory.

It is important to note that with Customary Level of Pre-Competitive Anxiety, another variable has been added to the research on the relationship between Customary Level of Performance and Customary Level of Pre-Competitive Anxiety. This variable is the State anxiety of the person and is transitory in nature and is characteristic of an athlete in terms of his attitude towards stressful competitive situations. For this reason, a new instrument of measuring State anxiety would seem to be necessary; a measure that would attend to both the dispositional and situational reactions of an athlete in stressful and non-stressful situations.

Spielberger (1970) has recently developed an inventory (State-Trait Anxiety Inventory) which measures situational State anxiety and dispositional or Trait anxiety. This inventory was used for the purposes of this study and is described in the second chapter.

On the basis of the theoretical framework of Customary Level of Pre-Competitive Anxiety formulated above, two more hypotheses have been generated:

Hypothesis 10: That measures of State anxiety, as assessed by Spielberger's State-Trait Anxiety Inventory, will successfully discriminate the anxiety levels of athletes in stressful and non-stressful competitive athletic situations.

Hypothesis 11: That by obtaining repeated measures of the State anxiety scores of athletes in stressful competitive athletic situations, and by securing repeated performance scores in these situations, an inverted U relationship between the athlete's Customary Level of Pre-Competitive Anxiety and his Customary Level of Performance will appear.

STATEMENT OF THE PROBLEM

The main purpose of this study was to investigate the effects of athletic competition on the pre-competitive anxiety of athletes performing in various sports as measured by the Spielberger State-Trait Anxiety Inventory.

A second purpose of this study was to examine the relationships between playing performance and the pre-competitive anxiety of basketball players.

A third purpose of the study was to examine Oxedine's propositions in Figure 1 on page 15 regarding the optimal arousal level for the typical participant in football and a variety of university sport activities.

II. METHODS AND PROCEDURE

INTRODUCTION

Several hundred athletes on different levels of competition across different sports were repeatedly administered a state anxiety inventory under two different experimental conditions: stressful and non-stressful conditions. After every game, the performance of each experimental subject was evaluated by respective coaches. Selected relationships between state anxiety and performance were then studied.

SUBJECTS

The subjects (Ss) of the study were 641 athletes participating in eight different sports on four different levels of competition as shown in Table 1. The names of all teams and the level and exact nature of competition are shown and fully described in Appendix A, Table 15.

The selection of the teams was based on availability at Levels 3 and 4, since only one team in each sport event was available to the experimenter. This was not so on Levels 1 and 2. In Senior High School Basketball League competition all participating teams, with the exception of only two, participated in the study. One team coach refused cooperation whereas the other non-participating team coach was not available to be contacted in time by the investigator.

TABLE 1

LEVELS OF COMPETITION AND DIFFERENT SPORTS IN WHICH Ss PARTICIPATED

Level of Competition	Sports
Level 1 Junior High School	football
Level 2 Senior High School	football, basketball
Level 3 Alberta Junior	football
Level 4 University of Alberta Golden Bear Teams	football, basketball, hockey, volleyball, wrestling, fencing, cross-country skiing, gymnastics

For practical reasons only seven Senior and three Junior High School Football Teams were included in the research. On the senior level where two city regional divisions, South and North, were played, the selection of three North side teams and four South side teams was based on the pre-season predictions of the strength of the teams by the coaches and sport writers in the Edmonton daily newspaper "Edmonton Journal". Since one of the objectives of this research was to compare the pre-competitive anxiety of athletes during the regular season and during the playoffs, the experimenter wanted to include only those teams from the two divisions that had a fair chance to make the playoffs. The three Junior football teams were included only because

the respective head coaches expressed interest in this research and wanted to be included in it.

Although it was hoped to secure the information on pre-competitive anxiety from the participating athletes from all the games and contests they were involved in, this was not possible to achieve. The reasons for missing some data were the following: 1. S forgot to fill out the questionnaire; 2. S did not want to cooperate; 3. S quit the team during the season; 4. coach forgot to administer the test; 5. coach misplaced the questionnaires; 6. there was not enough time to fill out the questionnaire; 7. the questionnaire was not filled out properly. The following criterion was used in selection of Ss for statistical analysis: Ss who failed to obtain four pre-competitive anxiety scores or more, were excluded from further research. Because of the large number of Ss and because over 4,000 responses from these Ss were obtained, the investigator felt that the attrition of the data did not cause any biases in subsequent statistical analysis.

EXPERIMENTAL VARIABLES

The eight independent variables in this study were: experimental conditions, trait anxiety, skill level, level of competition and sport events, nature of sport, injury history, degree of aggression, and position played. The two main dependent variables were state anxiety and playing performance.

Independent Variables

1. Experimental Conditions. There were basically two qualitatively different conditions in which Ss were tested: Non-stressful Conditions or Practice Environment, and Stressful Conditions or Pre-competitive Environment. Under Pre-competitive Environment, distinction was made between Regular Season Pre-competitive Environment and Playoff Pre-competitive Environment (see Table 3 on page 39).

2. Trait Anxiety. Two trait anxiety (A-Trait) groups of Ss were studied: High A-Trait Ss and Low A-Trait Ss. Generally, High A-Trait Ss scored above the Mean A-Trait of respective sports and levels of competition whereas Low A-Trait Ss scored below the Mean A-Trait of respective sports and levels of competition. Since 139 Ss were retested on A-Trait, a Mean A-Trait for these Ss was computed and subsequently used in statistical analysis.

3. Skill Level. On the basis of skill level of the respective teams in two sports, football and basketball, two groups of Ss were differentiated as Starters and Non-starters. Starters regularly started the game whereas Non-starters served as substitutes.

4. Level of Competition and Sport Events. There were four levels of football competition: Junior High School, Senior High School, Alberta Junior, and University; two levels of basketball competition: Senior High School, and University; and one, University level of competition, in all other sport events included in the study: hockey,

volleyball, wrestling, fencing, gymnastics, and cross-country skiing.

5. Nature of Sport. Team Sports (basketball, hockey, volleyball) were differentiated from Individual Sports (wrestling, fencing, cross-country skiing, gymnastics).

6. Injury History. Two groups of Ss were formed: Injury History Ss were Ss who had experienced more serious athletic injuries prior to the commencement of the experimental period whereas Non-injury History Ss had previously not had a similar experience. All Ss reporting minor injuries were excluded from the analysis (see Appendix F).

7. Degree of Aggression. All sports in the study were divided into three groups as a function of aggression as follows: Non-controlled Aggressive Sports: football, hockey, and wrestling; Controlled Aggressive Sports: basketball, fencing; and Non-aggressive Sports: volleyball, gymnastics, cross-country skiing.

8. Position Played. On the basis of skill involved for different positions in football, seven groups were identified on the basis of a study by Williams et al (1972): Group I.: offensive, defensive tackle; Group II.: defensive end, offensive center, offensive guard, offensive tight end; Group III.: defensive line backer, defensive corner back; Group IV.: quarterback; Group V.: defensive half back, offensive half back, offensive full back, flanker, split end; Group VI.: wing back, safety, wide receiver; Group VII.: kicker and others.

Dependent Variables

State Anxiety (A-State) and Playing Performance (P-Performance) were the two main dependent variables in this study. Since all Ss were repeatedly tested on A-State, three different mean A-State variables were derived and used in subsequent statistical analysis.

1. Mean A-State. This variable was computed for each S under each experimental condition. Three mean A-State scores were obtained and statistically treated: Practice Mean A-State, Regular Season Mean A-State, and Playoff Mean A-State. Playoff Mean A-State was available only for Ss who played more than one game in the playoffs. For Ss who played only one game in the playoffs, only one Playoff A-State was obtained. For these Ss this single Playoff A-State score was used in the analysis.

Generally, only two attempts were made to secure Practice A-State scores. Since some of the Ss skipped practice on the day of the test administration, only one Practice A-State score was obtained and statistically treated.

2. Overall Competitive Mean A-State. By averaging A-State scores over all games played for which A-State was obtained, an Overall Competitive Mean A-State score for each S was derived and used in certain statistical analyses.

3. Adequate Performance Mean A-State. This Mean A-State variable was computed on the basis of all competitive A-State scores which were associated with an average or an outstanding performance by the S.

EXPERIMENTAL MEASURES

In this study, two experimental measures were used: State Trait Anxiety Inventory and Coaches' Performance Evaluation Questionnaire.

State Trait Anxiety Inventory (STAI)

The STAI as originated by Spielberger (1970) consists of separate self-report scales for measuring A-Trait and A-State. The A-Trait scale consists of 20 statements (e.g., "I take disappointments so keenly that I can't put them out of my mind") that ask the S to report how he generally feels; the S rates himself on the following four-point scale: "almost never", "sometimes", "often", "almost always". The A-State scale consists of 20 statements (e.g., "I feel self-confident", "I feel nervous", "I feel jittery") that ask the S to indicate how he feels at a particular moment in time (e.g., immediately prior to the game or race); the S checks one of the following: "not at all", "somewhat", "moderately so", "very much so".

Four additional items were added to both scales. Items regarding sport, age, competitive experience, and previous injury, were added to A-Trait scale. Item "number of minutes prior to competition" was added to A-State scale. The four ratings associated with every

item on both scales were fully written out which assisted the Ss in their speed and accuracy. In the original scales, the items are associated with numbers 1, 2, 3, and 4, the meaning of which refers to the four ratings at the top of the scale. The two scales as used in this study, appear in Appendix B.

Coach's Performance Evaluation Questionnaire of the Athlete (CPEQ)

The CPEQ was developed by the investigator on the basis of extensive consultation with his advisers and many coaches. The performance of each athlete was evaluated subjectively by respective coaches on the following three-point scale: "below his ability performance", "close to his ability performance", and "outstanding performance". One point was given for poor performance, two points for an average or expected performance, and three points for an outstanding performance. This scale is presented in Appendix C.

The rationale for the scale was as follows: A completely subjective measure of evaluating performance has many advantages because of the many factors involved in each competitive situation which cannot be evaluated objectively. Intangibles such as the state of conditioning (at the time the evaluation is made), strength of the opposing team or competition, strategy employed, general health status, injuries, field conditions, and other similar factors influence every athlete's performance and cannot

be included in any objective measure devised so far. The coaches were well qualified to make such an evaluation since they knew the sport, the Ss and the conditions under which the evaluations were made.

EXPERIMENTAL DESIGN

The administration of experimental measures was divided into two main parts for the Ss, one part for the coaches, and one part for the independent observers as is summarized in Tables 2 and 3 on the following page. Each part of the experimental design is described in detail below.

All coaches whose teams were considered to be included in this research were approached by the investigator. After the research goals were fully explained, and the coach promised his cooperation, the first meeting with the team was arranged. After the introduction of the experimenter to the team by their coach, the athletes were informed of the details of the research project. The following points were stressed: 1. most other rival teams were also participating in the study; 2. the study was a longitudinal one and they would be required to cooperate repeatedly; 3. the study was concerned with their feelings immediately prior to the game; 4. the responses would not be seen by their coaches; and 5. their performance would be evaluated after the game. The athletes were asked for full cooperation in the research project and were also assured that the results would be available to them after the season.

TABLE 2

EXPERIMENTAL DESIGN FOR SUBJECTS

Experimental Conditions	Experimental Measures
A. Non-stressful Conditions	
1. Practice Environment	STAI A-State
2. Classroom Environment	STAI A-State and A-Trait
B. Stressful Conditions	
1. Regular Season Pre-competitive Environment	STAI A-State
2. Playoff Pre-competitive Environment	STAI A-State

TABLE 3

EXPERIMENTAL DESIGN FOR COACHES AND INDEPENDENT OBSERVERS

	Experimental Conditions	Experimental Measures
COACHES	Post-game Environment	CPEQ
INDEPENDENT OBSERVERS	Post-game Environment	CPEQ

Non-Stressful Conditions

The criterion for a non-stressful condition was a non-competitive classroom, locker room or playing field environment. The administration of the complete STAI to Ss was carried out in all three environments (see Appendix A, Table 15, A). Typically, however, the complete STAI was administered at a regular team meeting in the classroom or locker room environment, whereas the A-State Inventory was additionally administered during practices on the playing field or gym floor. The A-State Inventory was handed out with the following instructions: "Read the instructions on this form and then fill it out according to how you feel right now". Different instructions were given for A-Trait Inventory: "Fill out all questions on top of this form and then proceed to items 1 to 20 according to how you generally feel". A retest of the complete STAI was administered to some of the Ss one to two weeks after the respective competitive season (see Appendix A, Table 15, B and C).

Stressful Conditions

The criterion for a stressful condition or pre-competitive environment was that the A-State Inventory was administered with approximately one half hour or less before the athletic competition. There was one exception to this criterion. In University Football, the A-State Inventory was administered at the pre-game meal, five hours before the contest.

Before every game, the inventory was taken to the locker room where the Ss were changing. The athletes were asked to take the test without conversing with one another. The administration of the test was carried out by the experimenter or the respective coaches. The length of the experimental period, particular days of the week and the time of the day when the Ss were tested depended on the game scheduling of respective sports as shown in Appendix A, Table 15, D, E, and F. In basketball and hockey where more than ten games were expected to be played during the regular season, the experimental period commenced half way through the regular season.

Post-Game Conditions

With only one exception, after every game for which A-State Inventory was administered to the experimental Ss, the respective coaches were asked to evaluate the performance of every S on Coach's Performance Evaluation Questionnaire. This, however, was not done for University volleyball. To reduce the bias in the subjective evaluation of the Ss' performance, the coaches were contacted not earlier than one day after the game was played. In this way it was felt the emotional influence of a win or loss was lessened. This criterion was impossible to maintain for the Senior High School Basketball Playoff Tournament (city and provincial) where one or two games were played daily over a four or a two day interval, respectively. In these situations, the performance of the players was evaluated just prior to the

commencement of the next game in the tournament.

To determine the reliability of performance evaluation of two Senior High School basketball coaches, reliable observers were asked to evaluate players' performance independently for five playoff games by using Coach's Performance Evaluation Questionnaire. All observers were physical education teachers at the respective schools and were familiar with the performance of the players they were asked to evaluate.

STATISTICAL ANALYSIS

Since more than one State anxiety score was obtained for each S in any one of the experimental conditions, the S's Mean A-State value for each experimental condition was computed (for exceptions, see page 35; for experimental conditions, see Table 3 on page 39). These Mean A-State values were then treated statistically, with a series of two factor ANOVAs with repeated measures on one factor (Conditions) for testing the validity of Hypotheses 1, 2, 3, 5, and 9. Changes in Mean A-State values as a function of Trait anxiety, Skill level, and Competition level over the three experimental conditions were also presented schematically. These values appear in Appendix D.

It was observed that, typically, significant changes in Mean A-State values for all studied groups occurred between Practice and Regular Season with no significant changes shown between Regular Season and Playoffs. Therefore,

an Overall Competitive Mean A-State value for each S was computed by averaging individual A-State scores over all games played (during Regular Season and Playoffs). These new values were then used in subsequent statistical analysis which involved one and two way ANOVAs and T-tests for testing the validity of Hypotheses 6, 7, 8, and 9.

To test the validity of Oxedine's proposition on page 15, Adequate Performance Mean A-State values for the experimental Ss were computed. These values were obtained by averaging only those competitive A-State scores which were associated with average and outstanding performances. Again, one and two way ANOVAs were used for the analysis.

In studying the relationship between State anxiety and performance, a series of scatter diagrams was presented in which individual A-State scores were plotted against three levels of performance for Ss who differed in Trait anxiety, and Overall Competitive Mean A-State. From these diagrams bell-shaped curves were then obtained by employing the following procedure: 1. All A-State scores associated with an outstanding performance of the Ss under investigation (Low A-Trait or High A-Trait Ss, for example) were averaged into a mean A-State score. This score (a value on the horizontal axis), together with the Outstanding Performance (a value on the vertical axis), described the first point O on the bell-shaped curve (see Figure 2 on page 26); 2. All A-State scores associated with an Average Performance, but <u>smaller</u> than the already calculated mean A-State at O, were selected

and their means computed. This value then, together with associated Average Performance, represented point A_1 on the bell-shaped curve in Figure 2. When all scores larger than mean A-State value at O associated with an Average Performance were averaged, a mean A-State value was obtained which, together with the associated Average Performance (a point on the vertical axis), delineated point A_2 on the bell-shaped curve in Figure 2; 3. The same procedure was used for securing the last two points on the curve, P_1 and P_2, where the two Poor Performances are associated with a low and a high mean A-State value for the particular group of Ss under investigation. These computed mean A-State values for all performance levels of the respective groups of Ss are shown in Appendix E.

Scheffe's multiple comparisons procedure was used as the test on means for the main effects and the simple main effects of the significant interactions. Conclusions of the study were based on the .05 probability level of significance.

All analyses of variances with repeated measures were calculated by employing DERS 40 program, whereas all other statistical analyses of the study employed SPSS computer program obtained from the University of Alberta Computer Center.

III. RESULTS

INTRODUCTION

The data analyses were arranged into two sections. In the first section the effects of all Independent Variables on Mean A-State scores (see page 35 for derivation of this score) over the three Experimental Conditions were examined. The results of the performance - State anxiety relationship for the Ss who differed on A-Trait, Practice Mean A-State and Overall Competitive Mean A-State were schematically presented in the second section.

EFFECTS OF INDEPENDENT VARIABLES ON MEAN A-STATE

Effects of A-Trait and Experimental Conditions on Mean A-State Scores

The effects of Trait anxiety and Experimental Conditions on Mean A-State scores were evaluated in Table 4. In Figures 3 and 4, changes in Group Mean A-State values for High A-Trait Ss (HT) and Low A-Trait Ss (LT) in Football, Basketball and Hockey were plotted as a function of the Experimental Conditions at different levels of competition. Typically, most graphs demonstrate differences between the two groups with the HT graphs running higher than LT graphs. However, these differences were significant only at Junior and Senior High School levels of competition and University Basketball as indicated by significant F values for A-Trait in Table 4 (I., II., V., and VI.). There was, however, one

TABLE 4

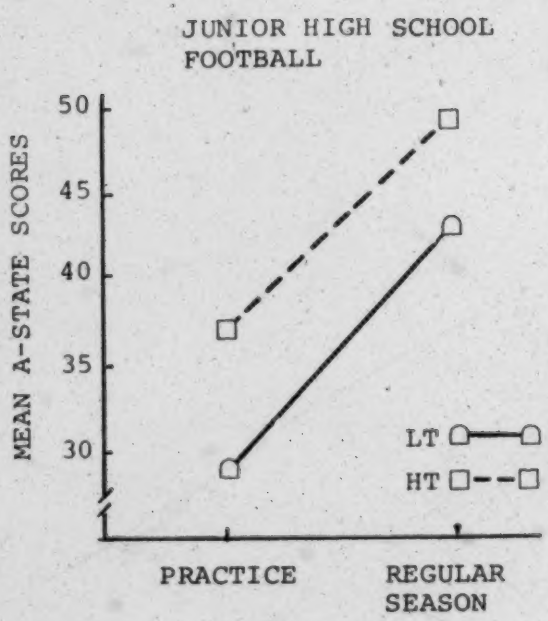
SUMMARY OF THE ANALYSES OF VARIANCE OF THE EFFECTS OF THE EXPERIMENTAL CONDITIONS ON MEAN A-STATE FOR HIGH A-TRAIT SUBJECTS AND LOW A-TRAIT SUBJECTS IN FOOTBALL, BASKETBALL AND HOCKEY

Level and Sport	Source of Variance	df	MS	F
I. Junior High Football	A-Trait (A)	1	2,278.4	37.58*
	Error (b)	90	60.6	
	Conditions (C)	1	8,348.4	153.11*
	A x C	1	64.6	1.19
	Error (w)	90	54.5	
II. Senior High Football	A-Trait (A)	1	1,472.8	15.04*
	Error (b)	64	97.9	
	Conditions (C)	2	5,003.2	126.31*
	A x C	2	9.5	0.24
	Error (w)	128	39.6	
III. Alberta Junior Football	A-Trait (A)	1	194.2	2.33
	Error (b)	23	83.4	
	Conditions (C)	2	735.3	28.77*
	A x C	2	15.4	0.60
	Error (w)	46	25.6	
IV. University Football	A-Trait (A)	1	30.3	0.65
	Error (b)	20	46.9	
	Conditions (C)	1	1,743.8	46.22*
	A x C	1	43.6	0.30
	Error (w)	20	37.7	
V. Senior High Basketball	A-Trait (A)	1	4,199.0	35.14*
	Error (b)	94	119.5	
	Conditions (C)	2	2,915.9	95.31*
	A x C	2	0.6	0.02
	Error (w)	188	30.6	
VI. University Basketball	A-Trait (A)	1	284.7	5.97*
	Error (b)	6	47.7	
	Conditions (C)	1	104.0	2.62
	A x C	1	13.8	0.35
	Error (w)	6	39.7	
VII. University Hockey	A-Trait	1	182.2	3.23
	Error (b)	10	56.4	
	Conditions (C)	2	3.2	0.32
	A x C	2	5.2	0.52
	Error (w)	20	10.1	

*p .05

FIGURE 3

MEAN A-STATE SCORES FOR HIGH A-TRAIT SUBJECTS (HT) AND LOW A-TRAIT SUBJECTS (LT) IN FOOTBALL AS A FUNCTION OF THE EXPERIMENTAL CONDITIONS AT FOUR LEVELS OF COMPETITION


JUNIOR HIGH SCHOOL
FOOTBALL
MEAN A-STATE SCORES
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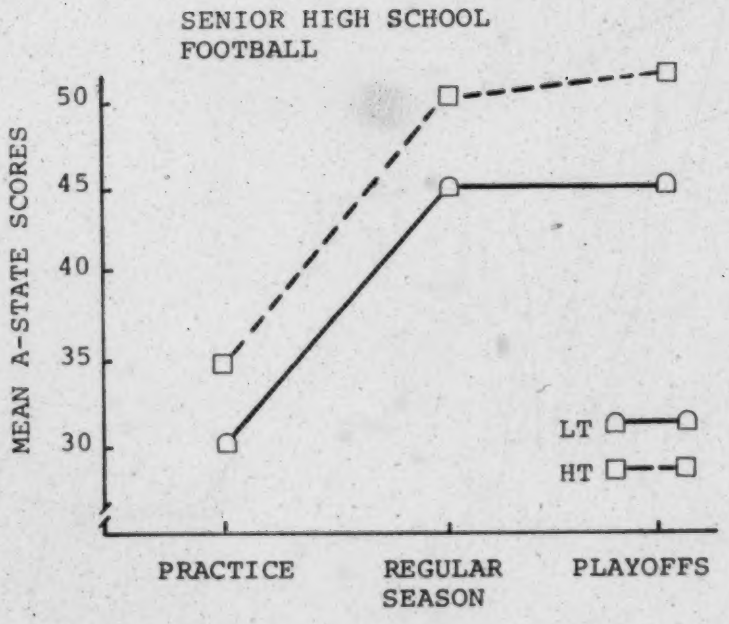
LT
HT
PRACTICE
REGULAR
SEASON


SENIOR HIGH SCHOOL
FOOTBALL
MEAN A-STATE SCORES
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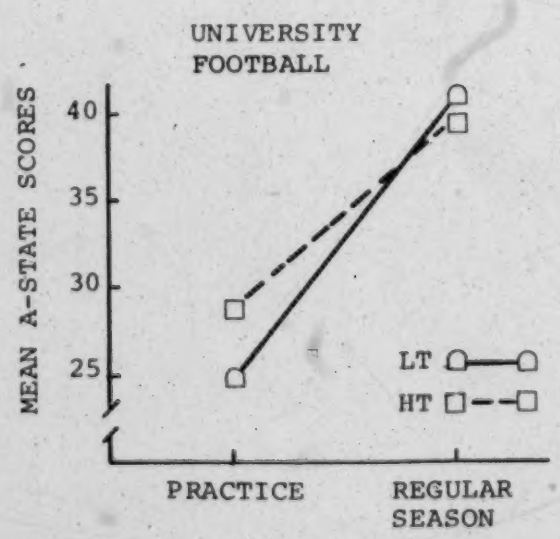
LT
HT
PRACTICE
REGULAR
SEASON
PLAYOFFS


UNIVERSITY
FOOTBALL
MEAN A-STATE SCORES
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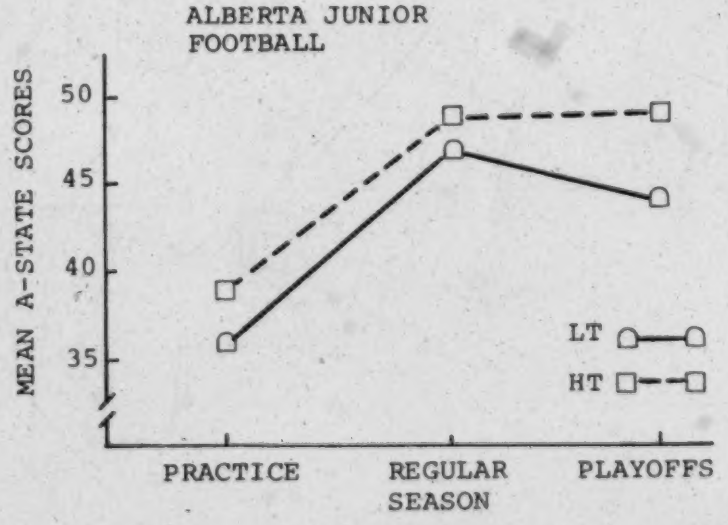
HT
PRACTICE
REGULAR
SEASON


ALBERTA JUNIOR
FOOTBALL
MEAN A-STATE SCORES
50
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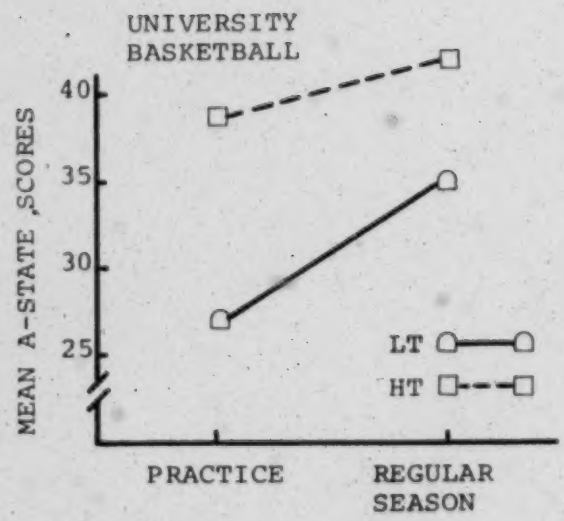
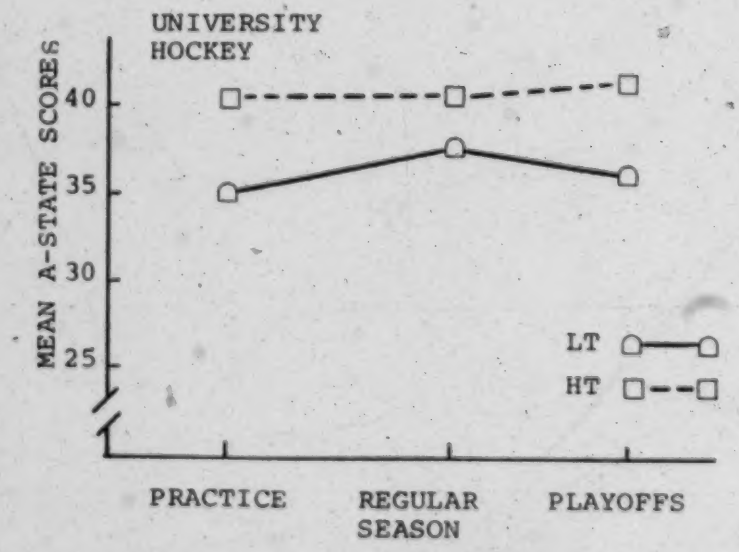
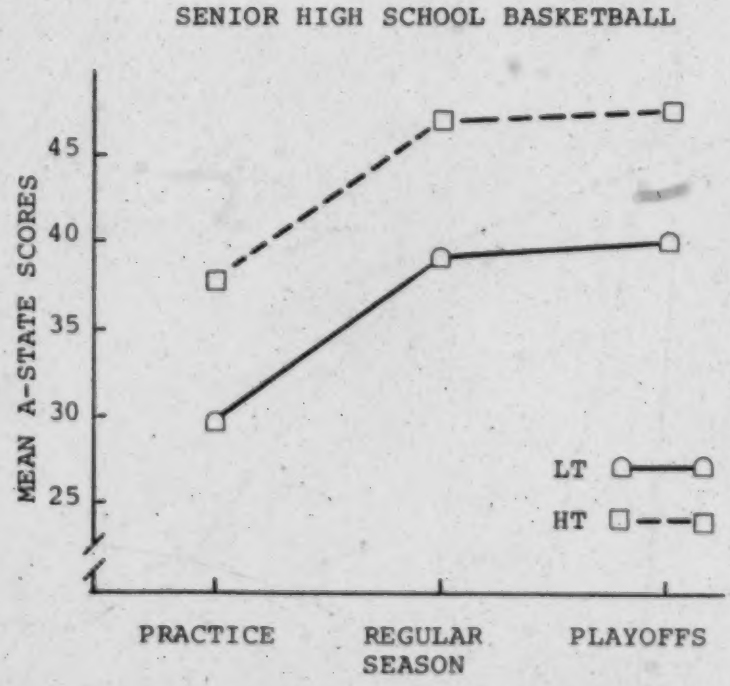
LT
HT
PRACTICE
REGULAR
SEASON
PLAYOFFS

FIGURE 4

MEAN A-STATE SCORES FOR HIGH A-TRAIT SUBJECTS (HT) AND LOW A-TRAIT SUBJECTS (LT) AS A FUNCTION OF THE EXPERIMENTAL CONDITIONS IN HOCKEY AND BASKETBALL







exception to these typical observations: in University Football the two graphs crossed with HT graph being higher than LT graph at Practice and running below it at Regular Season. The interaction, however, was not significant, even though significance occurred in the Conditions' treatment (Table 4, IV.). The expectations of the study (Hypotheses 2 and 3) that the Ss who differ in Trait anxiety would show corresponding differences in State anxiety, have thus been only partially supported.

There occurred no significant A-Trait by Conditions interaction (Table 4, I. to VII.) which is also demonstrated in Figures 3 and 4. The two graphs (except for University Football) are almost parallel and show similar changes over the three experimental conditions. With the only exception in University Hockey, where the HT and LT graphs do not exhibit any changes over the experimental periods, all other HT and LT graphs do show a sharp increase from their low in Practice and level off at Regular Season and Playoffs. These changes were all significant with the significance lying between Practice (non-stressful conditions) and Regular Season (stressful conditions) as indicated by post hoc multiple comparison analyses. This significant change in State anxiety was hypothesized in Hypothesis 1. Hypothesis 9 has also been confirmed since Spielberger's A-State Inventory has successfully discriminated the State anxiety levels of the experimental Ss between two experimental conditions: stressful and non-stressful competitive athletic situations.

Effects of Skill and Experimental Conditions on Mean A-State Scores

Starters (ST) were expected to show higher pre-competitive anxiety than non-starters (NST) by Hypothesis 4. The results of the analyses of variance in Table 5 (I. to VI.) indicate, contrary to expectations, no significant Skill level main effect. In all instances, however, Conditions main effect demonstrated significance. The results of multiple comparison analyses located these significances between Regular Season and Playoffs in University Basketball, but everywhere else between Practice and Regular Season. This has also been demonstrated in Figures 5 and 6.

The experimental conditions differentially affected the two groups of Ss in Senior High School Basketball since there occurred a significant Skill by Conditions interaction (Table 5, V.). This differential effect occurred at Playoffs as determined by multiple comparison analyses and is also demonstrated by the graphs in Figure 6 (Senior High School Football). There is a slight elevation of ST curve from Regular Season to Playoffs, indicating higher Mean A-State scores at Playoffs. On the other hand, NST curve showed an unexpected slight decline from Regular Season to Playoffs, indicating lower Mean A-State scores at Playoffs.

Effects of Levels of Competition and Experimental Conditions on Mean A-State Scores

The differences between Mean A-State scores of Ss at different levels of Football and Basketball competition were

TABLE 5

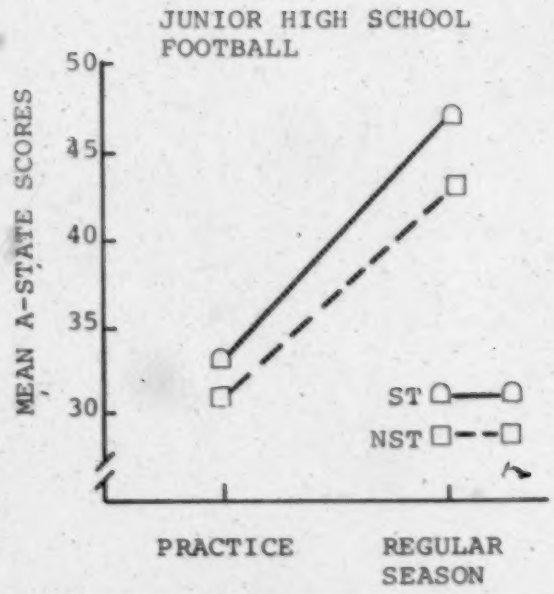
SUMMARY OF THE ANALYSES OF VARIANCE OF THE EFFECTS OF THE EXPERIMENTAL CONDITIONS ON MEAN A-STATE FOR STARTERS AND NON-STARTERS (SKILL) IN FOOTBALL AND BASKETBALL

Level and Sport	Source of Variance	df	MS	F
I. Junior High Football	Skill (A)	1	242.4	2.91
	Error (b)	90	83.2	
	Conditions (C)	1	8,348.4	152.88*
	A x C	1	57.5	1.05
	Error (w)	90	54.6	
II. Senior High Football	Skill (A)	1	178.0	1.40
	Error (b)	67	126.9	
	Conditions (C)	2	5,071.1	117.11*
	A x C	2	59.2	1.36
	Error (w)	134	43.3	
III. Alberta Junior Football	Skill (A)	1	76.3	0.92
	Error (b)	29	82.8	
	Conditions (C)	2	1,109.1	49.66*
	A x C	2	50.8	2.27
	Error (w)	58	22.3	
IV. University Football	Skill (A)	1	91.6	2.09
	Error (b)	20	43.8	
	Conditions (C)	1	1,743.8	43.95*
	A x C	1	4.7	0.12
	Error (w)	20	39.7	
V. Senior High Basketball	Skill (A)	1	246.4	1.53
	Error (b)	94	161.6	
	Conditions (C)	2	2,915.9	101.90*
	A x C	2	186.6	6.52*
	Error (w)	188	28.6	
VI. University Basketball	Skill (A)	1	0.6	0.02
	Error (b)	5	26.1	
	Conditions (C)	2	360.7	5.83
	A x C	2	7.0	0.10
	Error (w)	20	67.0	

*p .05

FIGURE 5

GROUP MEAN A-STATE VALUES FOR STARTERS (ST) AND NON-STARTERS (NST) IN FOOTBALL AS A FUNCTION OF THE EXPERIMENTAL CONDITIONS AT FOUR LEVELS OF COMPETITION


JUNIOR HIGH SCHOOL
FOOTBALL
MEAN A-STATE SCORES
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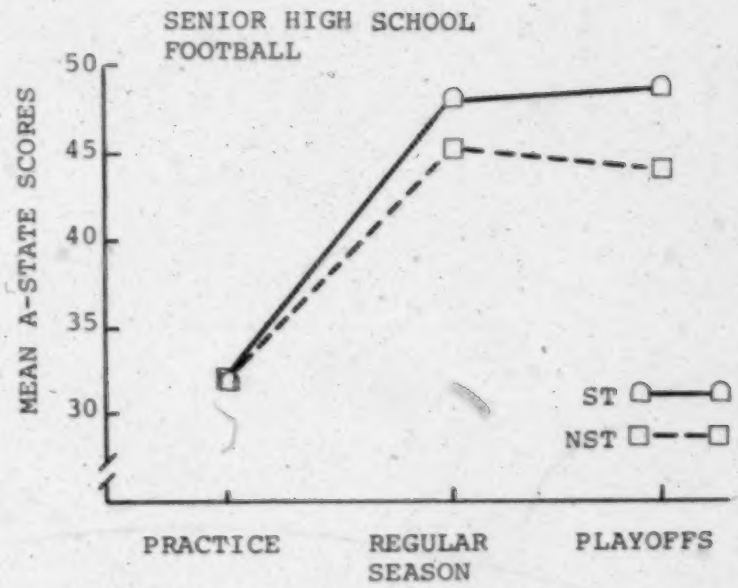
PRACTICE
REGULAR
SEASON


SENIOR HIGH SCHOOL
FOOTBALL
MEAN A-STATE SCORES
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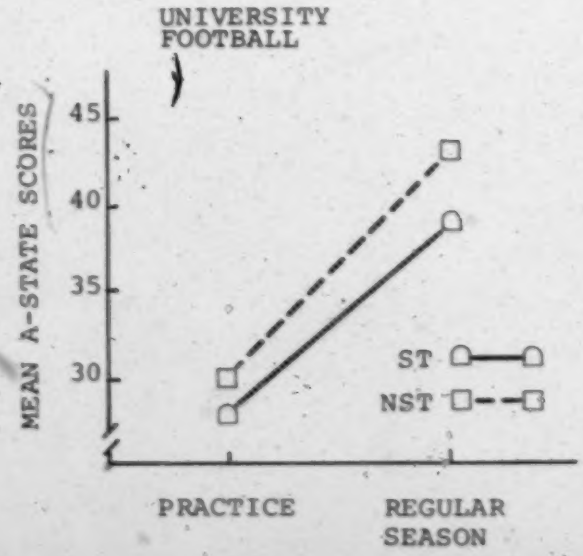
REGULAR
SEASON
PLAYOFFS


UNIVERSITY
FOOTBALL
MEAN A-STATE SCORES
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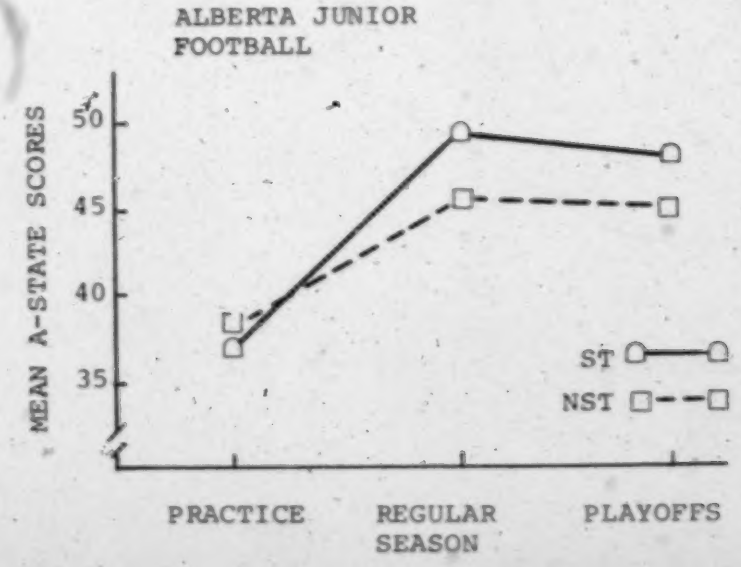
SEASON


ALBERTA JUNIOR
FOOTBALL
MEAN A-STATE SCORES
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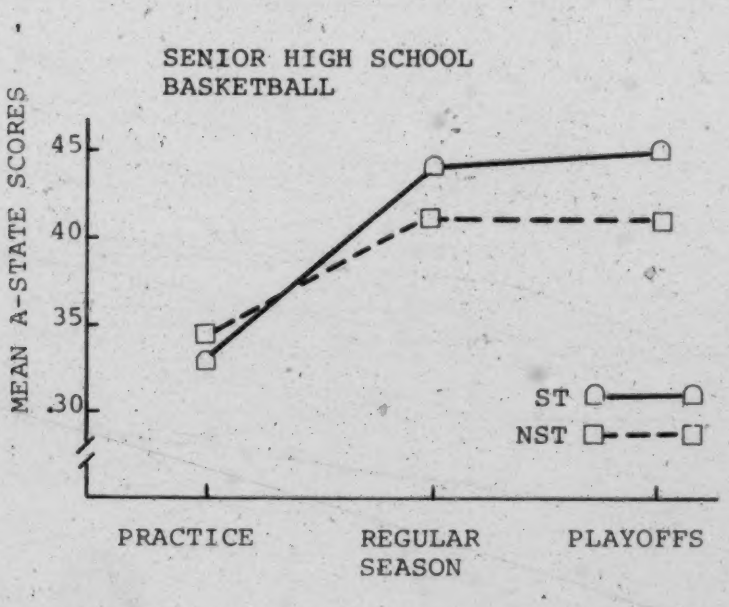
PRACTICE
REGULAR
SEASON
PLAYOFFS

FIGURE 6

MEAN A-STATE SCORES FOR STARTERS (ST) AND NON-STARTERS (NST) IN BASKETBALL AS A FUNCTION OF THE EXPERIMENTAL CONDITIONS AT TWO LEVELS OF COMPETITION



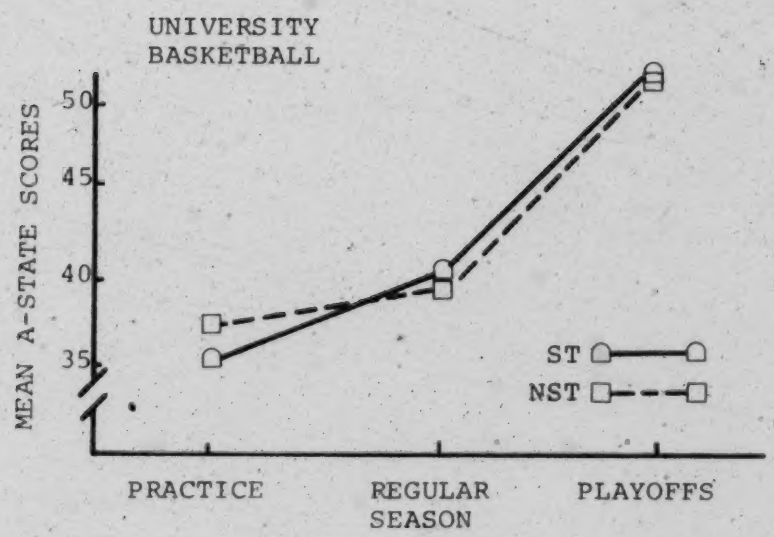


TABLE 6

SUMMARY OF THE ANALYSES OF VARIANCE OF THE EFFECTS OF THE EXPERIMENTAL CONDITIONS AND LEVELS OF COMPETITION ON MEAN A-STATE FOR FOOTBALL AND BASKETBALL

Sport	Source of Variance	df	MS	F
I. Football	Level (L)	3	658.0	8.70*
	Error (b)	319	75.6	
	Conditions (C)	1	24,708.4	567.39*
	L x C	3	26.3	0.60
	Error (w)	319	43.5	
II. Football	Level (L)	1	241.1	2.12
	Error (b)	98	113.8	
	Conditions (C)	2	6,020.1	161.25*
	L x C	2	160.1	4.28*
	Error (w)	196	37.3	
III. Basketball	Level (L)	1	121.3	0.78
	Error (b)	100	155.6	
	Conditions (C)	2	3,012.9	96.77*
	L x C	2	150.2	4.82*
	Error (w)	200	31.1	

*p .05

studied in Table 6 and plotted in Figures 7 and 8. In Football, two ANOVAs with repeated measures were necessary. In the first analysis (Table 6, I.), all Football levels of competition were only studied over the two experimental conditions, Practice and Regular Season, because Playoff Mean A-State scores for Junior High School and University Football were not available. However, they were available for Senior High School and Alberta Junior Football. There-

fore, a separate ANOVA with repeated measures on Conditions was run (Table 6, II.) for these two levels of competition. As in previous analyses in Football, the F values for Conditions in both analyses were significant with all the variance occurring between Practice and Regular Season. This was also shown in Figure 7.

In Football, there were differences between Levels of Competition as indicated by a significant F value for Levels (Table 6, I.). Multiple comparison analyses applied to differences between Level means showed that Ss at the University level were significantly different (lower on Mean A-State) from Alberta Juniors and Senior High School Ss. Schematically, this significance is demonstrated in Figure 7, where simple main effects were plotted. University graph ran significantly below the graphs of Alberta Juniors and Senior High.

FIGURE 7

MEAN A-STATE SCORES IN FOOTBALL AS A FUNCTION OF THE EXPERIMENTAL CONDITIONS AT FOUR LEVELS OF COMPETITION

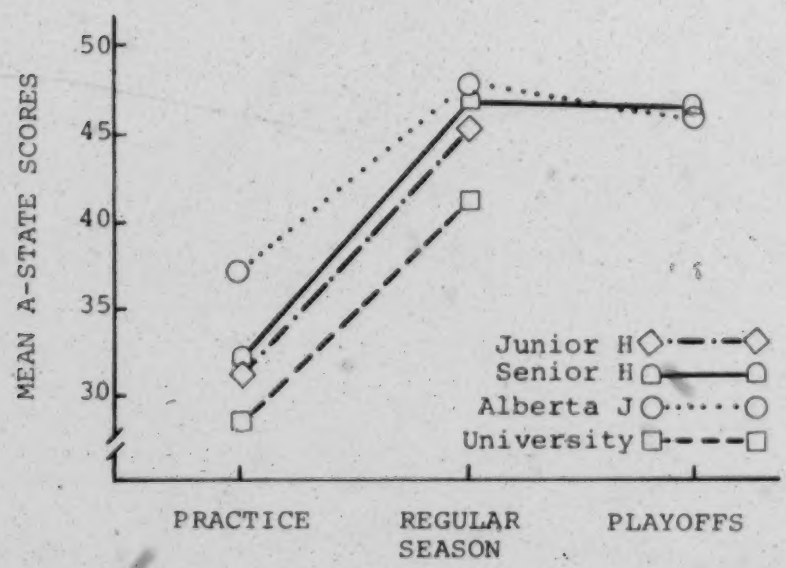
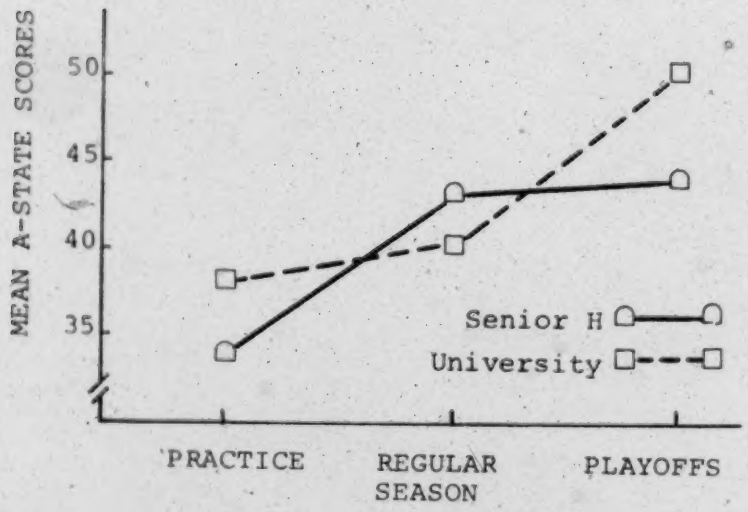


FIGURE 8

MEAN A-STATE SCORES IN BASKETBALL AS A FUNCTION OF THE EXPERIMENTAL CONDITIONS AT TWO LEVELS OF COMPETITION



In Basketball results of the analysis of variance (Table 6, III.) show significant F's for Conditions and Level by Conditions interaction. In Figure 8 the significant interaction was graphicaly presented. Mean A-State for University Ss was higher at Practice and Playoffs then Senior High. At Regular Season, however, Mean A-State for Senior High was above University. Results of multiple comparison tests of simple main effect for Conditions revealed that all the variance over experimental conditions for the University Ss occurred between Regular Season and Playoffs, whereas at Senior High School Level these differences were between Practice and Regular Season.

A typical observation in the analyses thus far has been that there are significant changes in Mean A-State

from Practice to Regular Season and almost no changes in these values from Regular Season to Playoffs. The only exceptions to these typical changes were obtained in the two University sports, Basketball and Hockey. In University Basketball, these changes occurred between Regular Season and Playoffs, whereas there were no significant changes over all three experimental conditions in University Hockey.

Therefore, an Overall Competitive Mean A-State value (for derivation of this value, see page 35) for each S was computed and used in subsequent statistical analysis. Only the changes in this variable as a function of the Nature of Sport, Injury History, and Aggression, were thus studied.

Effects of Nature of Sport on Overall Competitive Mean A-State

It was predicted that Ss in Individual sports would experience higher levels of State anxiety than Ss in Team

TABLE 7

RESULTS OF T-TEST ANALYSIS ON OVERALL COMPETITIVE MEAN A-STATE BETWEEN Ss IN UNIVERSITY TEAM AND INDIVIDUAL SPORTS

Sport	Number of Cases	Mean	Standard Error	Degrees of Freedom	T Value
Team	36	33.0	1.62	83	1.17
Individual	49	35.0	0.90		

*p .05

sports when in similar athletic competitive situations (Hypothesis 6). Results of a T-test analysis on the Overall Competitive Mean A-State values between Ss in University Team and Individual Sports (Table 7) reveal no significant differences.

Effects of Levels of Aggression and A-Trait on Overall Competitive Mean A-State

The effects of the three Levels of Aggression on Overall Competitive Mean A-State of Ss who differed on A-Trait in University sports are presented in Table 8. The nonsignificant F values for Aggression in Table 8 (I., II., and III.) do support the expectation of the

TABLE 8

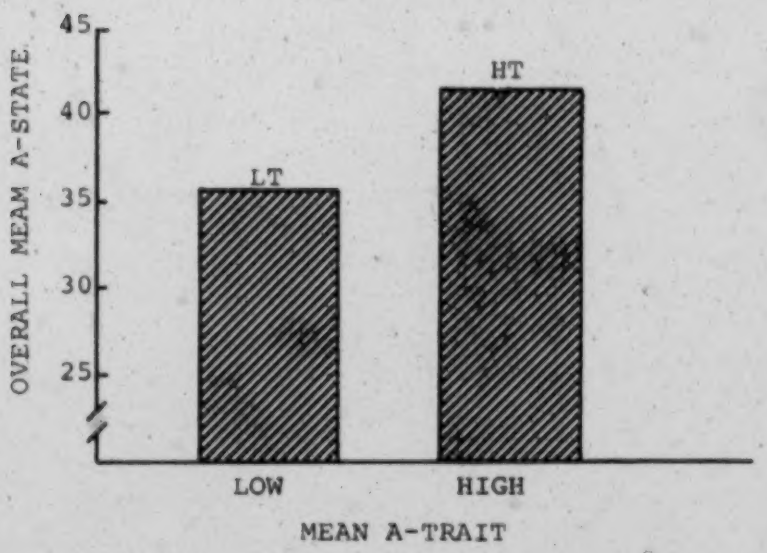
SUMMARY OF THE ANALYSES OF VARIANCE OF THE EFFECTS OF LEVELS OF AGGRESSION ON OVERALL COMPETITIVE MEAN A-STATE OF Ss WHO DIFFERED ON A-TRAIT AT UNIVERSITY LEVEL

Sport	Source of Variance	df	MS	F
I. All Sports	A-TRAIT (A)	1	206.6	3.600
	AGGRESSION (B)	2	88.8	1.547
	A x B	2	80.0	1.394
	ERROR	78	57.4	
II. Team Sports	A-TRAIT (A)	1	143.6	4.064*
	AGGRESSION (B)	2	3.6	0.102
	A x B	2	11.5	0.326
	ERROR	47	35.3	
III. Individual Sports	A-TRAIT (A)	1	22.0	0.254
	AGGRESSION (B)	2	286.1	3.285
	A x B	2	155.5	1.904
	ERROR	25	87.1	

*p .05

FIGURE 9

HISTOGRAM OF GROUP OVERALL COMPETITIVE MEAN A-STATE VALUES FOR HIGH AND LOW A-TRAIT Ss IN UNIVERSITY TEAM SPORTS AT DIFFERENT LEVELS OF AGGRESSION



study (Hypothesis 7). The only significance was obtained for A-Trait effects in Team Sports (Table 8, II.). Results of multiple comparison analyses revealed that HT Ss in Non-controlled and Controlled Aggressive Sports scored significantly higher on Overall Competitive Mean A-State than did LT Ss. These significant differences are plotted and shown in Figure 9.

Effects of Injury History on Overall Competitive Mean A-State

Hypothesis 8 expected similarities in State anxiety for Ss who differed in injury history. Hypothesis 9 expected similarities in State anxiety for previously injured Ss who

TABLE 9

SUMMARY OF THE ANALYSIS OF VARIANCE OF THE EFFECTS OF INJURY HISTORY AND NON-INJURY HISTORY IN FOOTBALL ON OVERALL COMPETITIVE MEAN A-STATE AT FOUR LEVELS OF COMPETITION

Source of Variance	df	MS	F
Injury History (I)	1	100.44	1.625
Level (L)	3	223.15	3.610*
I x L	3	51.48	0.832
Error	267	61.81	

*p .05

differed in Trait anxiety.

A summary of the variance analysis and the results of T-test analyses in Tables 9 and 10 show no significant differences between Ss with an Injury History and Ss with no Injury History at four different levels in Football competition and in University Non-controlled Aggressive

TABLE 10

RESULTS OF T-TEST ANALYSIS APPLIED TO THE DIFFERENCES BETWEEN INJURY HISTORY MEANS FOR Ss IN UNIVERSITY NON-CONTROLLED AGGRESSIVE SPORTS

Injury History	Number of Cases	Mean	Standard Error	Degrees of Freedom	T Value
INJURED	9	45.5	2.98	29	1.58
NON-INJURED	31	41.0	1.28		

*p . .05

TABLE 11

RESULTS OF T-TEST ANALYSIS APPLIED TO THE DIFFERENCES BETWEEN A-TRAIT MEANS FOR Ss WITH INJURY HISTORY IN UNIVERSITY NON-CONTROLLED AGGRESSIVE SPORTS

A-Trait	No. of Cases	Mean	Standard Error	Degrees of Freedom	T Value
LOW	10	43.1	2.97	29	1.13
HIGH	21	40.0	1.26		

*p ..05

Sports. There were also no significant differences between previously injured Ss who differed on A-Trait (Table 11).

Effects of Playing Positions in Football on Adequate Performance Mean A-State

Examination of the results of the analyses of the effects of seven different playing positions in Football on Adequate Performance Mean A-State values as presented in Table 12 show no significant differences between Positions at any level of Football competition.

Differential Effects of a Variety of University Sports on Adequate Mean A-State Values

Differential effects of a variety of University sports on Adequate Mean A-State Values are examined in Table 13. The significant F ratio indicates that there were differences in Adequate Performance Mean A-State between at least two sports. However, a multiple com-

TABLE 12

SUMMARY OF THE ANALYSES OF VARIANCE OF THE EFFECTS OF PLAYING POSITIONS IN FOOTBALL ON ADEQUATE MEAN A-STATE AT FOUR LEVELS OF COMPETITION

Level	Source of Variance	df	MS	F
Junior High	Between Positions	6	167.45	1.94
	Within Positions	61	86.20	
Senior High	Between Positions	6	49.86	0.83
	Within Positions	176	60.09	
Alberta Junior	Between Positions	3	60.46	1.36
	Within Positions	20	44.35	
University	Between Positions	2	40.03	0.86
	Within Positions	16	46.28	

*p . .05

parison analysis yielded no differences between any pair among seven sports.

Summary of Main Findings

In summary of this section of the results, the main findings indicated that Spielberger's A-State Inventory successfully discriminated stressful and non-stressful situations in athletic competition. Typically, State

anxiety scores demonstrated a significant increase from Practice (non-stressful conditions) to Regular Season and Playoffs (stressful conditions), thus supporting Hypotheses 1 and 10. Hypotheses 2 and 3 were only partially supported

TABLE 13

SUMMARY OF THE ANALYSIS OF VARIANCE OF THE EFFECTS OF SEVEN DIFFERENT UNIVERSITY SPORTS ON ADEQUATE A-STATE

Source of Variation	df	MS	F
Between Sports	6	130.45	2.28*
Within Sports	76	57.09	

*p .05

with significant differences between High and Low A-Trait Ss on their State anxiety scores at Junior and Senior Football and Basketball levels of competition and University Basketball competition. Hypothesis 5 was confirmed only for Football Competition. University Football was significantly different from Senior High School and Alberta Junior Football levels of competition. Skill level, Nature of Sport, Aggression level, and Injury History did not significantly change State Anxiety of the experimental Ss. Thus, Hypotheses 4 and 6 were not, whereas Hypotheses 7, 8, and 9 were supported by the findings of this study.

A-STATE - PLAYING PERFORMANCE RELATIONSHIPS IN SENIOR HIGH SCHOOL BASKETBALL

The A-State - Performance relationship in this study was examined only for the more extreme Mean A-Trait Ss in Senior High School Basketball. In this analysis all Ss with a Mean A-Trait[1] score lying within plus or minus of one and one half standard deviation around the mean, were excluded from the analysis and only Very Low and Very High Mean A-Trait Ss were retained.

Two scatter diagrams are presented in Figures 10 and 11. In these scatter diagrams State anxiety scores for Ss who differed on Mean A-Trait in Senior High School Basketball are plotted against three levels of performance. By employing the statistical procedure described in the Statistical Analysis section on pages 43 and 44, two curves were derived and are shown in Figure 12.

It can be observed in Figure 12 that the two curves, one for Very Low Mean A-Trait Ss and one for Very High Mean A-Trait Ss, are very similar in shape. For a clearer presentation, the Very Low Mean A-Trait Ss' curve is presented above the Very High Mean A-Trait Ss' curve. Both curves, however, are bound by identical coordinates: Performance (vertical) and A-State scale (horizontal) axes.

In Figure 12, it is observed that the outstanding

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[1] For computation of Mean A-Trait for each S see page 35.

FIGURE 10

SCATTER DIAGRAM: INDIVIDUAL A-STATE SCORES AGAINST PERFORMANCE FOR VERY HIGH MEAN A-TRAIT Ss IN SENIOR HIGH SCHOOL BASKETBALL

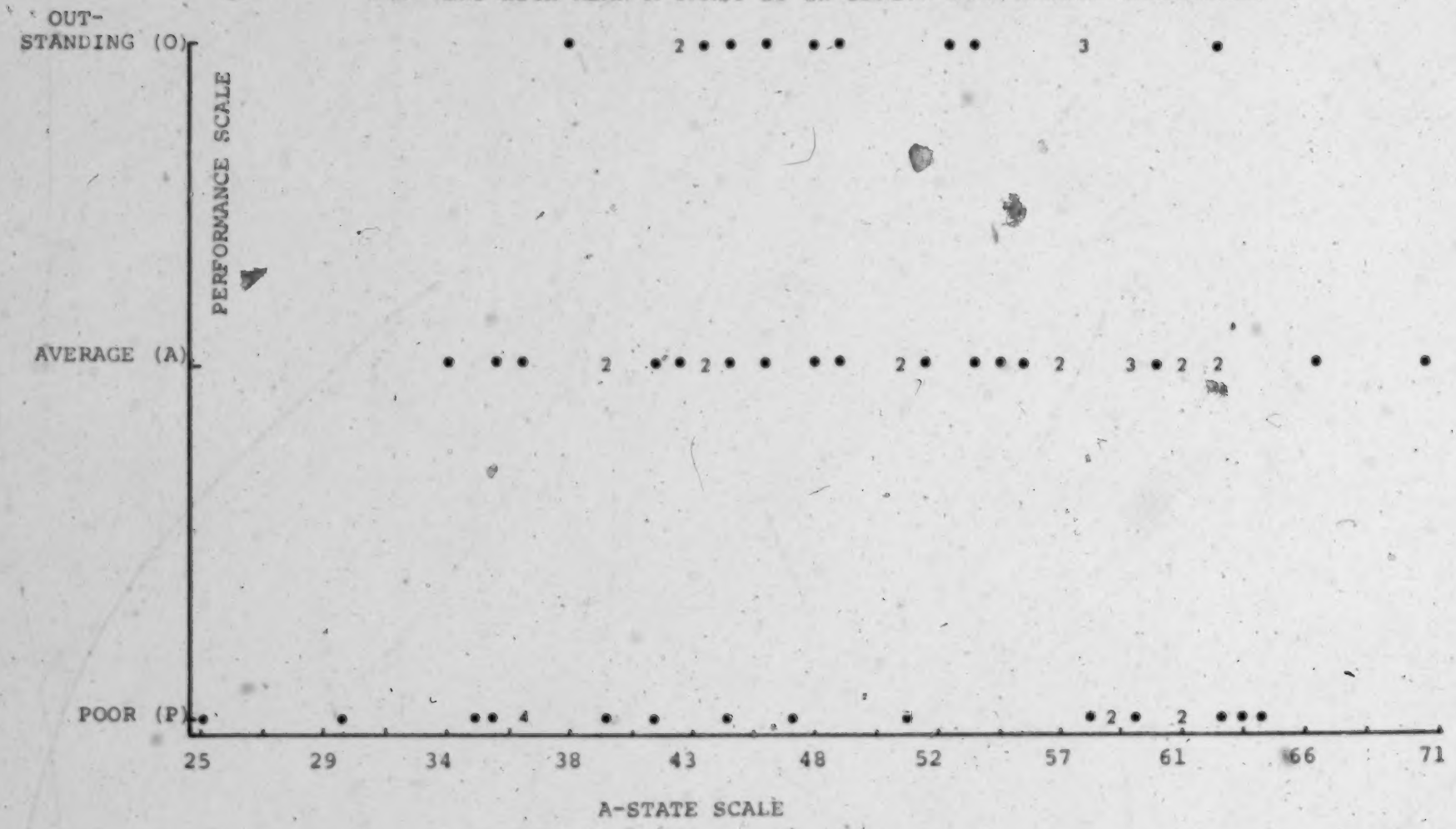


FIGURE 11

SCATTER DIAGRAM: INDIVIDUAL A-STATE SCORES AGAINST PERFORMANCE FOR VERY LOW MEAN A-TRAIT Ss IN SENIOR HIGH SCHOOL BASKETBALL

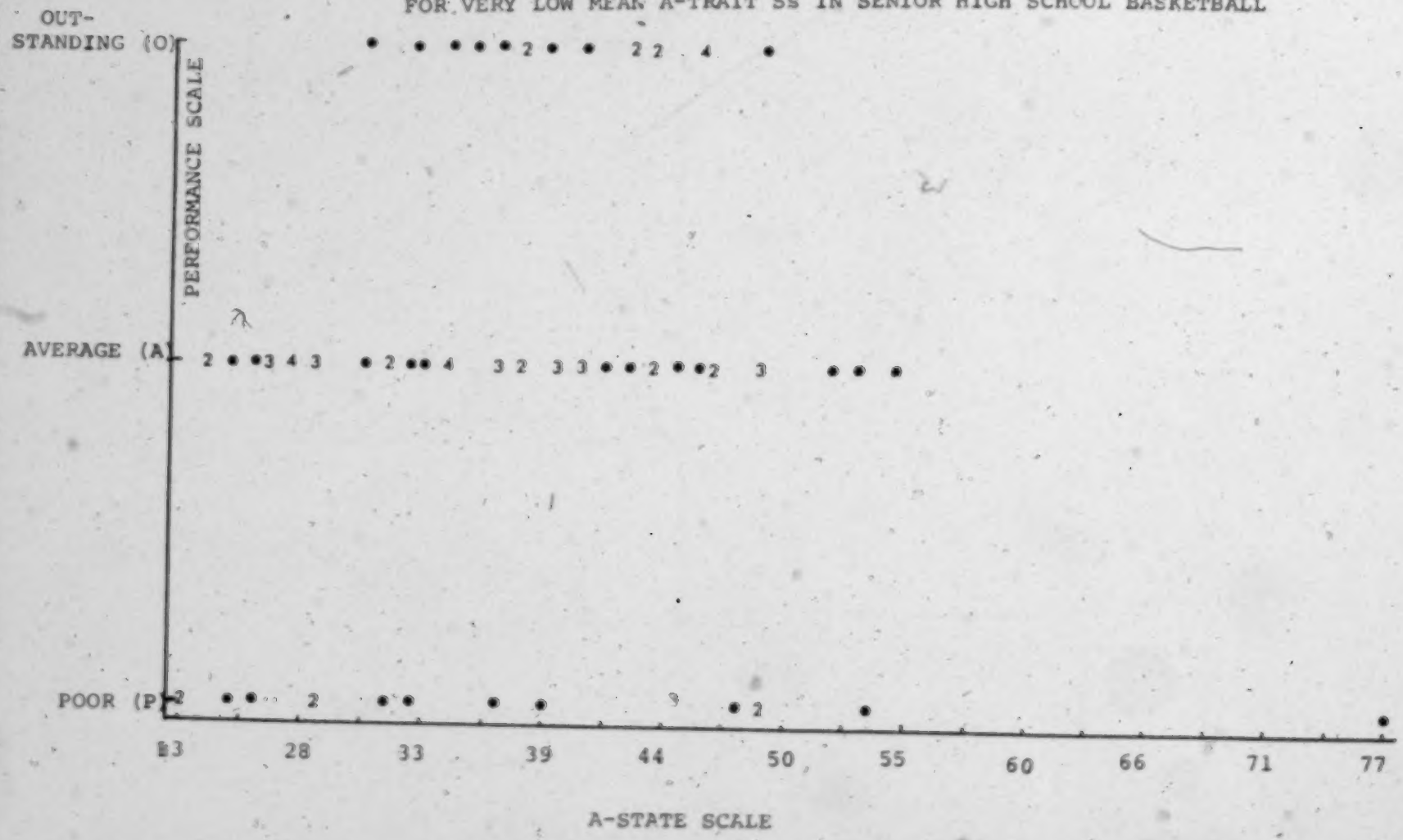
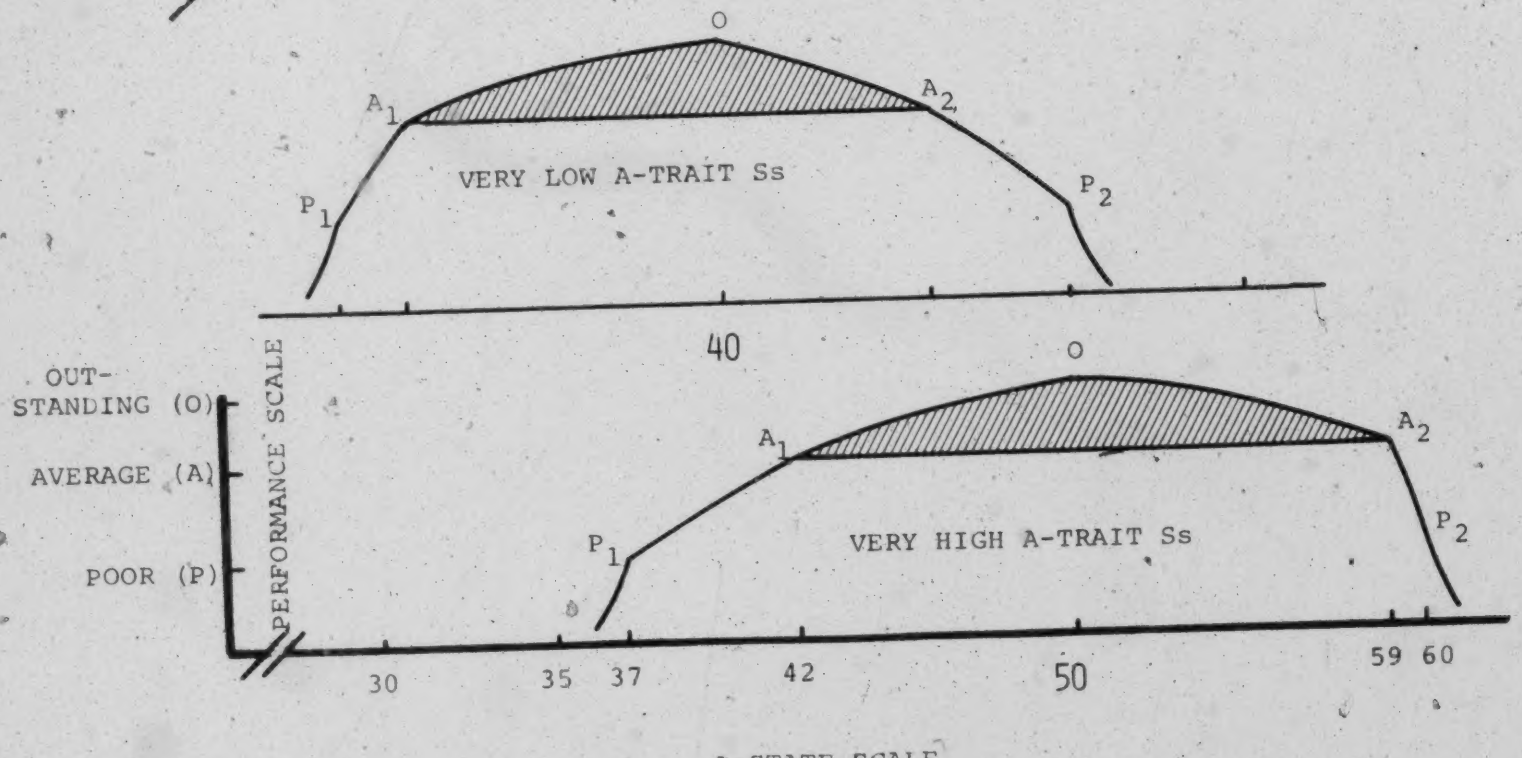


FIGURE 12

BELL-SHAPED RELATIONSHIPS BETWEEN A-STATE SCORES AND PLAYING PERFORMANCE OF Ss VERY LOW AND VERY HIGH ON MEAN A-TRAIT IN SENIOR HIGH SCHOOL BASKETBALL



Performance (designated O on the two curves) for Very High A-Trait Ss was associated with an A-State value of 50, whereas Average and Poor Performances were each related to two A-State scores, a low value and a high value, on each side of the Outstanding Performance (O) in such a manner that a bell-shaped curve for the relationship between the two variables appeared. Average Performance (A_1 and A_2 on the curve, Figure 12) was associated with a low mean A-State value of 42 and a high mean A-State value of 59, whereas Poor Performance (P_1 and P_2 on the curve, Figure 12) was associated with a low value of 37 and a high value of 60. Similarly, the Outstanding Performance point (O) for Very Low A-Trait Ss was associated with an A-State value of 40, whereas Average and Poor Performances were each related to two A-State values, a low and a high, on each side of the Outstanding Performance (O) in such a manner that again a bell-shaped curve for the relationship between the two variables was obtained.

Although the two bell-shaped curves in Figure 12 show separation a substantial overlap remained since both Outstanding Performance points (O's) were only 10 points apart on the State anxiety scale.

The same graphical analyses as above were performed for extreme Ss who differed on Overall Competitive Mean A-State[1] (Figures 13 through 15). The two curves (Very Low and Very High

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[1] See page 35 for derivation and meaning of Overall Competitive Mean A-State scores.

FIGURE 13

SCATTER DIAGRAM: INDIVIDUAL A-STATE SCORES AGAINST PERFORMANCE FOR VERY HIGH OVERALL COMPETITIVE MEAN A-STATE Ss IN SENIOR HIGH SCHOOL BASKETBALL

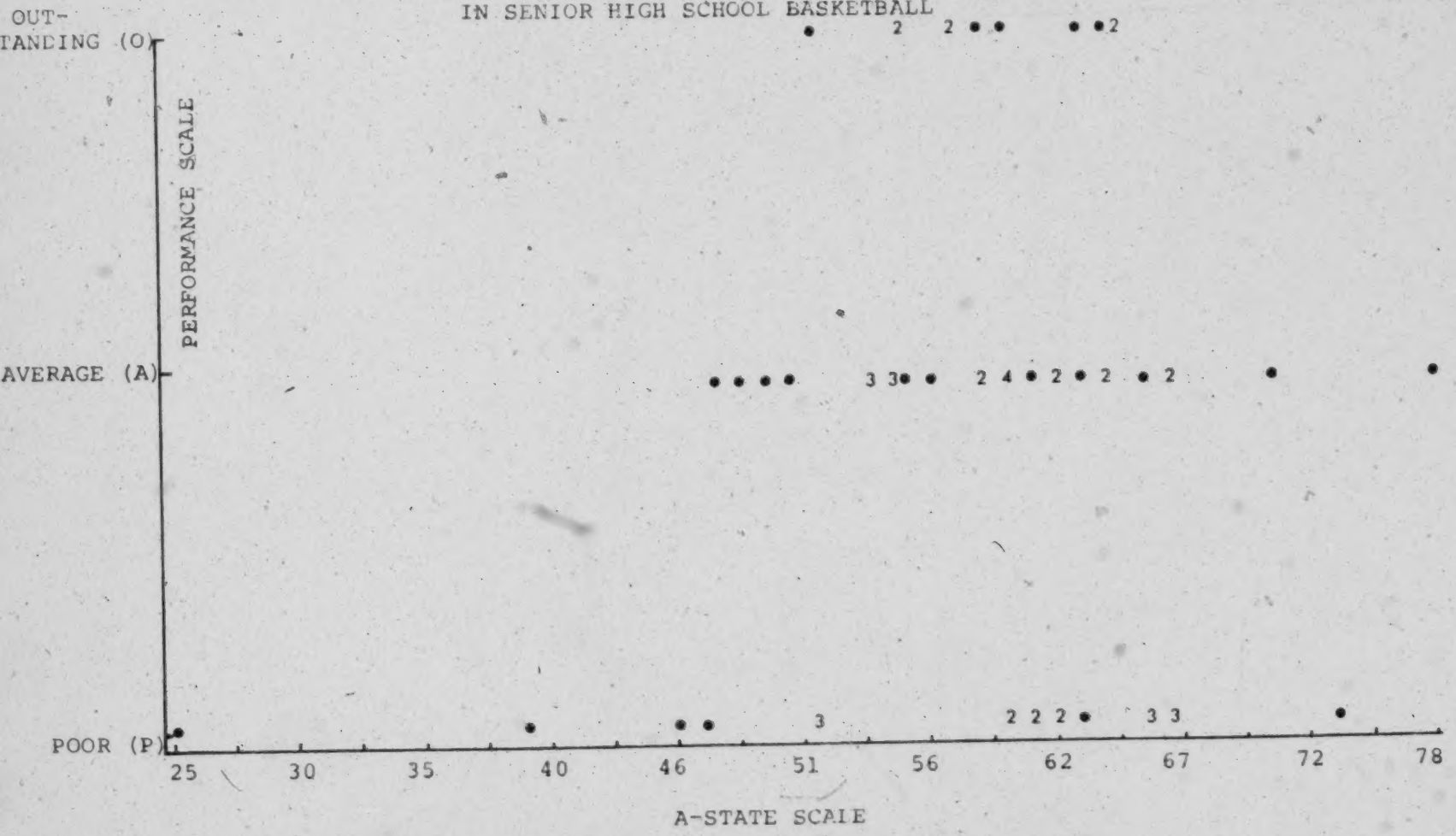


FIGURE 14

SCATTER DIAGRAM: INDIVIDUAL A-STATE SCORES AGAINST PERFORMANCE FOR VERY LOW OVERALL COMPETITIVE MEAN A-STATE Ss IN SENIOR HIGH SCHOOL BASKETBALL

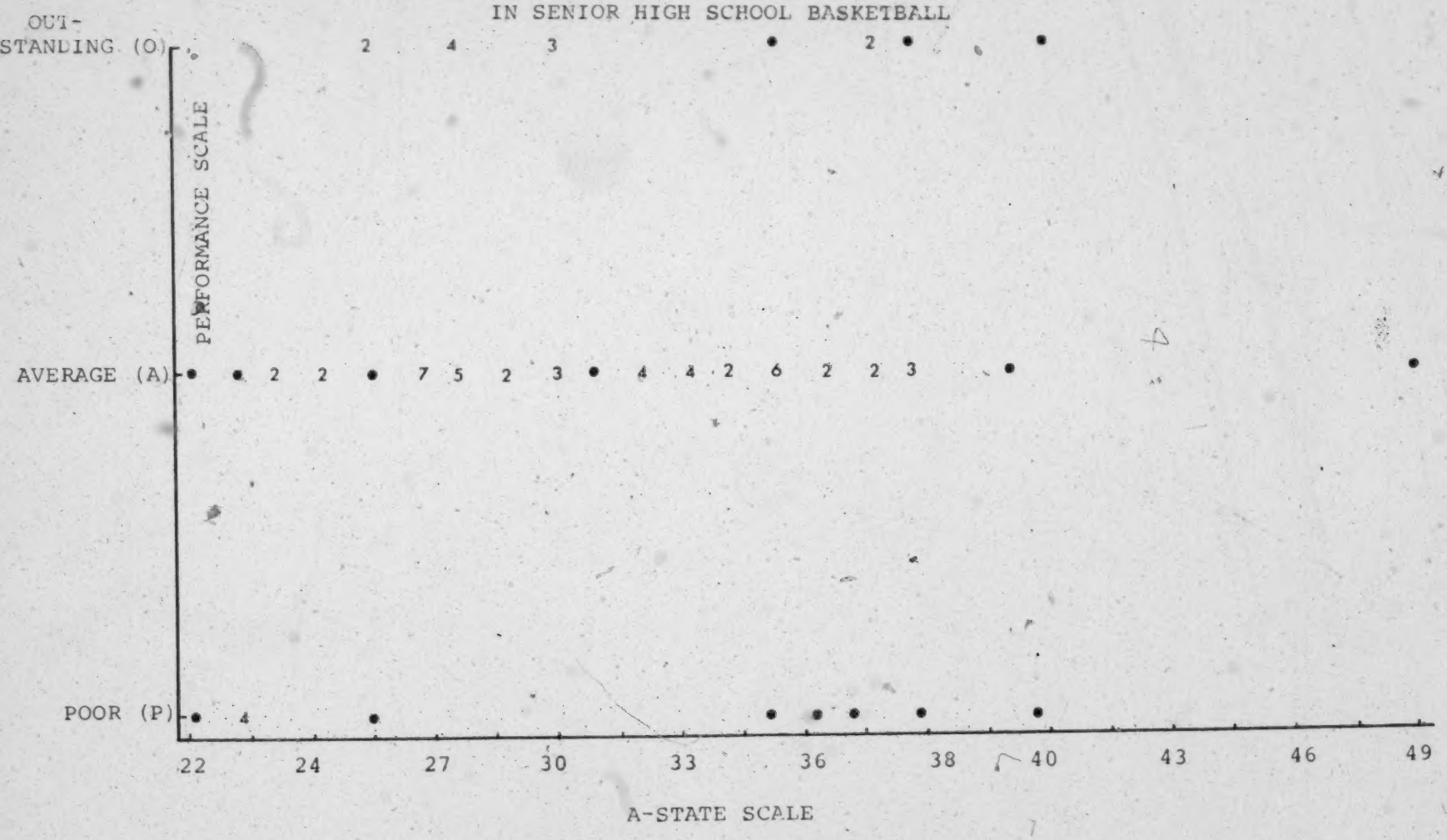
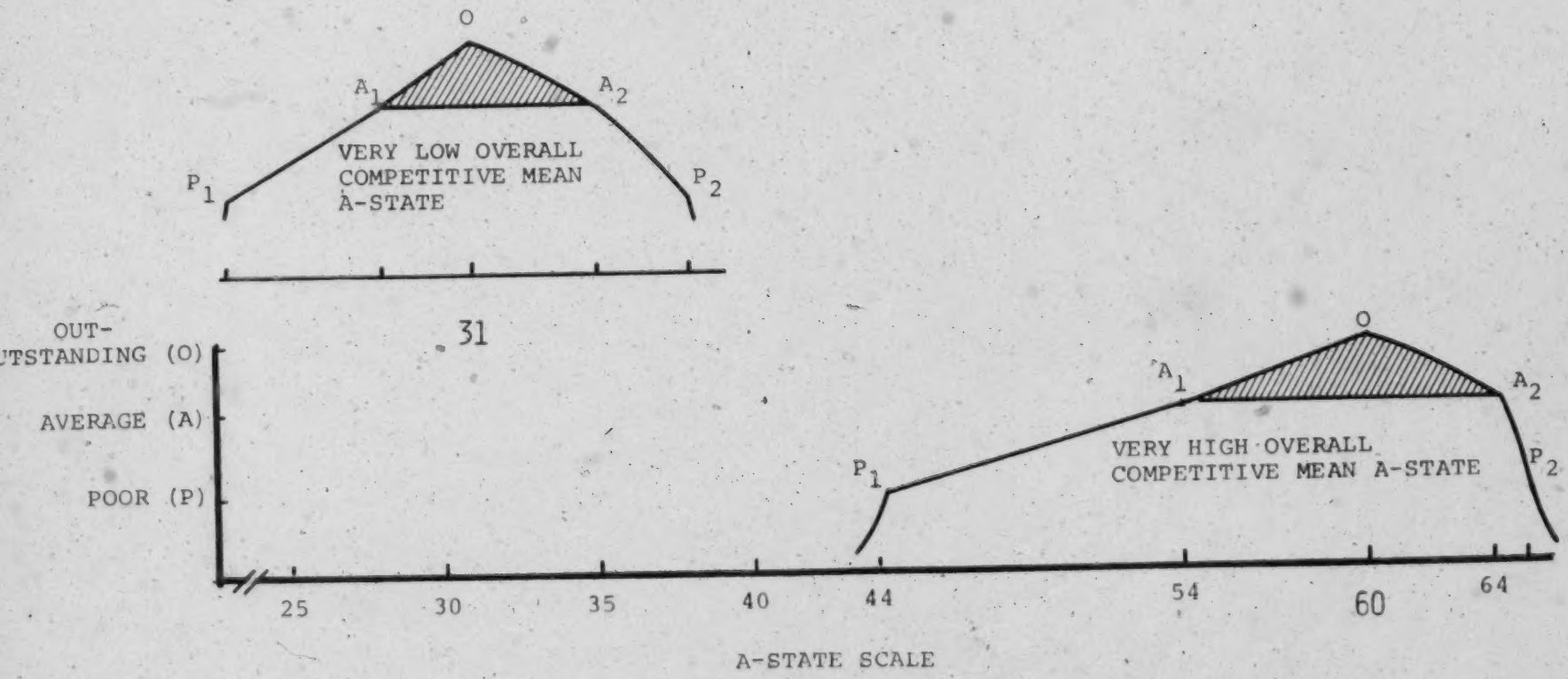


FIGURE 15

BELL-SHAPED RELATIONSHIPS BETWEEN A-STATE SCORES AND PLAYING PERFORMANCE OF Ss VERY LOW AND VERY HIGH ON OVERALL COMPETITIVE MEAN A-STATE IN SENIOR HIGH SCHOOL BASKETBALL



Overall Competitive Mean curve) in Figure 15 as derived from the two scatter diagrams (Figures 13 and 14) demonstrated a separation of the two curves for these extreme groups of Ss on Overall Competitive Mean A-State. The separation between the two central Outstanding Performance points (O's) of the two curves for Very Low and Very High Overall Competitive Mean A-State Ss was 23 points as compared to 10 separation points on the same A-State scale for the Very Low and Very High Mean A-Trait Ss' curves described above. Again, both curves demonstrate a bell-shaped relationship between State anxiety and Performance in Senior High School Basketball. The details associated with each point on these curves are found in Appendix E, Table 21.

Estimations of Performance Evaluation Reliability of Coaches and Observers

Reliability estimates of performance evaluation of coaches and independent observers for two Senior High School Basketball teams in four and one Playoff Games respectively are shown in Table 14. The estimates of reliability of a single judge from all five games ranged between .445 and .729. The estimates of reliability of all judges (coaches and independent observers) were somewhat higher: between .675 and .836.

Summary of Main Findings

The main findings of this section clearly demonstrate a nonmonotonic relationship between State anxiety and

TABLE 14

ESTIMATES OF RELIABILITY OF JUDGING PLAYING PERFORMANCE OF THE PLAYERS ON TWO BASKETBALL TEAMS FOR A SINGLE JUDGE (r_1), OBSERVER OR COACH, AND FOR ALL JUDGES (r_k) IN FIVE PLAYOFF GAMES

Reliability Coefficient	Strathcona				Bonnie Doon
	GAME 1	GAME 2	GAME 3	GAME 4	GAME 1
One Judge	$r_1=0.445$	$r_1=0.277$	$r_1=0.729$	$r_1=0.552$	$r_1=0.561$
All Judges	$r_{k\,(k=3)}=0.706$	$r_{k\,(k=5)}=0.657$	$r_{k\,(k=3)}=0.890$	$r_{k\,(k=3)}=0.675$	$r_{k\,(k=4)}=0.836$

Performance, thus confirming Hypothesis 11, which stated that by obtaining repeated State anxiety scores of the experimental Ss in stressful competitive athletic situations, and by securing repeated performance scores in these situations, a picture of the relationship between the two variables would appear. Another major finding was the fact that the Ss who differ on Trait anxiety, Practice State anxiety and Overall Competitive State anxiety exhibit similar curves demonstrating a bell-shaped Performance - State anxiety relationship. These curves are allocated at different levels on Spielberger's A-State Inventory Scale, thus delineating two qualitatively different Performance - State anxiety relationships, one for the Ss who were Low and the other for the Ss who were High on A-Trait or Practice Mean A-State or Overall Competitive Mean A-State.

IV. DISCUSSION

INTRODUCTION

In this study, the level of State anxiety in experimental Ss who performed their usual tasks in non-stressful (Practice Environment) and stressful (Regular Season and Playoff Athletic Competitive Environments) conditions, was repeatedly measured by means of Spielberger's STAI A-State scale. Performance of the Ss was also assessed by their respective coaches and recorded. In the first part of this chapter, the effects of independent variables on State anxiety in the experimental Ss presented in the Results chapter will be further discussed. The second part will feature and underline more clearly both the research and practical implications of the State anxiety - Performance relationship. The State-Trait Anxiety Inventory will be discussed at the end of the Chapter.

EFFECTS OF EIGHT MAJOR INDEPENDENT VARIABLES ON STATE ANXIETY

Effects of Athletic Competition on State Anxiety

In general, the findings of present study indicated that State anxiety increased in response to the stress associated with athletic competition (see Figures 3, 4, 5, and 6 on pages 48, 49, 54, and 55). This indicated that athletic competition is a stressful environment to the

participants as predicted in Hypothesis 1, i.e., it evoked significant elevations in State anxiety immediately prior to the contest. Typically, the increase in State Anxiety in Ss across the different sports at different levels of competition was significant. It was consistently observed that significant rises occurred between Practice and Regular Season, but then stabilized over the two stressful competitive conditions, Regular Season and Playoffs. This observation is in agreement with previous research (Lampman, 1966; Miller, 1960; Knapp, 1960; Ginn, 1954; and Johnson, 1949, 1951) which demonstrated changes in anxiety, emotional stresses, and reactions[1] in athletes in competition which were measured with psychological instruments.

There were, however, two exceptions to this general observation. In University Hockey (see Figure 4 on page 49), the State anxiety remained stable over all three experimental conditions, whereas in University Basketball (see Figure 6 on page 55), a significant change was exhibited between Regular Season and Playoffs. These anomalies, where appropriate, will be covered in the discussion below.

Tutko has, on the basis of clinical research, speculated, contrary to the results of this study, that "The more crucial the contest, the higher the degree of anxiety[2]" (1971: 917). Results of the present study,

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[1] The various terms as used in the research, most likely refer to State anxiety in athletes as defined and investigated in this study.

[2] This term refers to State anxiety.

however, contradict this speculation since State anxiety in Football and Senior High School Basketball, where Playoffs occurred, did not demonstrate any changes from Regular Season competition to Playoff Competition. Intuitively, Playoff competition may be regarded as a more crucial contest than Regular Season competition because it decides the eventual winner. Every contest is important and by losing, further competition is terminated. Additionally, only the best teams remain and winning becomes progressively more difficult. Therefore, the longer a team (or a player) stays in Playoff competition, the greater, it would appear, is the psychological threat of such competition to the individual members of the team. The same reasoning would apply to championship contests and tournaments.

To clarify the obvious disagreement between the results of this study and Tutko's speculation, another variable, Playing Performance of the athletes, in such psychologically intensified conditions, has to be introduced. In the introductory chapter, the present investigator has proposed a Customary Level of Performance linked to a Customary Level of Pre-Competitive Anxiety of the athlete (pages 25 through 28) within the inverted U model of the relationship between arousal and performance as put forward by Duffy (1962). In Figure 2 on page 26, the Customary Level of Pre-Competitive Anxiety is depicted as a range between A'_1 and A'_2 on the Pre-Competitive Anxiety axis, whereas

Customary Level of Performance is depicted as a range between A and O on the Performance axis. The two variables describe an area under the curve which is shaded. The findings of this study, plotted in Figures 10 through 15 (pages 67, 69, 70, 72, 73, and 74), confirmed these theoretical propositions. An inverted U relationship between Performance and State anxiety for Senior High School Basketball players was found in these curves with the shaded areas representing Customary Level of Performance and Customary Level of Pre-Competitive Anxiety.

Theoretically, then, although elevation in State anxiety in Playoffs and other championship competitions over and above the Customary Level of Pre-Competitive Anxiety required by Customary Level of Performance is quite possible, it is elevated at the expense of a decrease in performance. Such a below-par performance could be explained by Easterbrook's cue utilization postulation. University Basketball from this study was a good example of this. The team was far superior to all other teams in Western Canadian Intercollegiate Basketball competition. During the entire Regular Season competition they had, according to the coach and players, never fully achieved their true performance potential, because it was not required due to less experienced opposition. Despite below-par performance throughout the season, their win - loss record was impressive (19:1). The team's Customary Level of Pre-Competitive Anxiety during the Regular Season was not significantly different from their level of A-State anxiety

experienced during Practice conditions (see Figure 6 on page 55). However, when the team competed in the Final National Collegiate Tournament, the Pre-Competitive Anxiety experienced by the team before the first game went out of control to the point where their playing performance disintegrated. The team achieved their worst loss of the season, losing by more than 30 points to an opponent who was similar in physique, skill, and experience. For the exact nature of University Basketball Competition, see Appendix A, Table 16.

On the basis of the results of this study, it seems that the relationship between Customary Level of Performance and Customary Level of Pre-Competitive Anxiety is a stable one. Once it is established during the Regular Season, it is maintained throughout Playoffs and Championship Tournaments. This finding is thus in disagreement with Tutko's speculation and agrees with Singer who states that ". . . the highly proficient athlete is one who demonstrates not only superb skills, but also emotional control under all sorts of circumstances" (1972: 125).

There are coaches who create very stressful practices, not only by extremely demanding physical workouts, but also by creating a highly competitive environment among the team members in which the players continuously have to fight for their positions on the team. This internal competition within the team is psychologically threatening to players who experience similar elevations in State anxiety as it

is experienced before real competition against other teams. This was observed in University Hockey in Figure 4 on page 49, where State anxiety remained virtually stable at a high level over all experimental conditions. Such a situation was deliverately created by the University of Alberta Golden Bears hockey coach[1].

Effects of Trait Anxiety on State Anxiety

Hypotheses 2 and 3 stated that athletes who differed in Trait anxiety would show corresponding differences in State anxiety when in similar non-competitive and pre-competitive situations. Results of the study as presented in Figures 3 and 4 on pages 48 and 49, did demonstrate differences in State anxiety between the Low and High Trait Ss over the experimental conditions. High Trait Ss with the exception of University Football in Regular Season experienced higher State anxiety than Low Trait Ss, but these differences were significant only at Junior and Senior High School levels of competition, and University Basketball. The expectations of the study (Hypotheses 2 and 3) were thus only partially supported, because in only three out of seven cases were the differences significant. It is interesting to note that the vertical differences in State anxiety between Low Trait and High Trait Ss remained stable, except for University Football. This would seem to indicate that athletic competition does not

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[1]Personal communication from Mr. C. J. Drake.

always differentially affect the two groups. The practical implications of this observation are important, because it is generally believed (Singer, 1972: 127; Cratty, 1973: 174) that High Trait athletes[1] have to be calmed down, whereas Low Trait a hletes have to be activated, for the purpose of bringing both groups to an optimal level (or, in this study, Customary Level of Pre-Competitive Anxiety) for an optimal performance (or, in this study, Customary Level of Performance). On the basis of the results of this study, differential pep talks (one for the High Trait and one for Low Trait) in athletics would seem to be redundant.

Effects of Skill on State Anxiety

As far as the effects of Skill on Pre-Competitive Anxiety are concerned, previous research seems to be in disagreement. Lampman (1966) reported no differences between champion and non-champion swimmers, whereas Miller (1960) reported that poor competitors experienced less stress than average and outstanding competitors and Knapp (1960) found novice gymnasts under more stress than the middle and experienced groups. In the present study, no significant differences were found between Ss who were regular players on their teams (Starters) and Ss who were substituting the regulars (Non-starters). This agrees with Lampman's (1966) findings. Graphical presentation of these results is found in Figures 5 and 6, on

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[1] It is generally believed that High Trait athletes are easily aroused and in competition tend to be over-aroused, whereas the opposite would be true for Low Trait Ss.

pages 54 and 55. Thus, Hypothesis 4 which stated that athletes who differed in Skill would show corresponding differences in Pre-Competitive Anxiety in similar athletic competitive situations, was not confirmed.

In the light of these apparent contradictory results in research on the effects of Skill on Pre-Competitive Anxiety in athletics, it is notable that the following five factors might have had crucial bearings on the outcome of such contradictory comparisons in the research:

1. Differences in Population Selection (level and sport): University varsity swimmers (Lampman); High School track and field athletes (Miller); University gymnasts (Knapp); University, Alberta Junior and Senior and Junior High School Basketball and Football players (present study).
2. Differences in Skill classification: champion and non-champion athletes (Lampman); poor and outstanding athletes (Miller); novice, intermediate and experienced athletes (Knapp); regular starters and non-starters (present study).
3. Differences in sex: men only (Lampman, Miller, present study); women only (Knapp).
4. Differences in Research Methodology: IPAT-8 Parallel Form Anxiety Battery Test (Lampman); Self-appraisals of Approach and Avoidance Conflict Scales (Knapp); Confidence Rating Scale (Miller); STAI A-State (present study).

On the basis of such diversification in subject selection, methodological procedures, and skill class-

ification, inconsistencies in research findings may be expected.

Effect of Levels of Competition on State Anxiety

The athletes at higher levels of competition were expected to experience less State anxiety than athletes at lower levels of competition (Hypothesis 5). Spielberger assumes that more experienced individuals develop effective coping responses for stressful situations to reduce the intensity level of State anxiety. If the results of this study were to confirm this postulation, the following would have had to be shown for Football: Junior High School players would experience more State anxiety in athletic competition than Senior High School players who in turn would experience higher levels of State anxiety than Alberta Juniors who would score higher yet than University Football players. Similarly, Senior High School Basketball players would have to experience higher Pre-Competitive Anxiety states than University Basketball players. The results showed that University Football players were significantly (lower) than Alberta Juniors and Junior High School players in experiencing State anxiety in Football competition. However, it is important to note that State anxiety in University Football was measured five hours before the contest and not immediately before the game time as was the case with all other sports at all levels. This difference in test administration, coupled with all other

nonsignificant differences in both sports, suggests the possibility that State anxiety of University Football players was significantly different from the other levels of competition because of the time difference in testing and not because true differences existed between different levels of Football competition.

Effects of Nature of Sport Event on State Anxiety

In this study, the athletes in Individual Sports were expected to experience higher levels of Pre-Competitive Anxiety than Team Sports participants (Hypothesis 6). In Individual Sports it is much more obvious when an athlete performs poorly, because he alone is responsible for an error and cannot cover it. In many Team Sports, such as rowing in an eight-oared crew, individual mistakes are virtually undetectable even to the coach or a movie camera. Therefore, it is assumed that a greater psychological threat would impinge on an athlete in Individual Sports, thus evoking higher Pre-Competitive Anxiety. When University Team Sports (Hockey, Football, Basketball, Volleyball) were compared to University Individual Sports (Wrestling, Cross-country Skiing, Fencing, Gymnastics), no significant differences were found. Thus, Hypothesis 6 was not supported. The results also contradict Tutko's speculation that "Athletes who are involved in individual sports such as golf, gymnastics, and so on, are more affected than those in team sports" (1971: 918) as far as Pre-Competitive Anxiety is concerned. The fact that Football, Basketball,

and Hockey are regarded as the three most cherished sports at the University of Alberta may possibly explain these nonsignificant differences in Pre-Competitive Anxiety in Team and Individual university sports. The psychological threats of athletic competition to the individual players in Team sports may well be as high as are the psychological threats of competing alone on athletes in Individual sports. Performing badly in a football game may result in immediate replacement of the poor player, whereas a bad performance in a cross-country ski race has no such stringent consequences. Factors like big crowds, peer pressure, media coverage, pressured coaching, may have additional effects on Pre-Competitive Anxiety elevations in athletes in Team sports of this study.

Effects of Aggression and Injury on State Anxiety

The failure to find any relationship between measure of Trait anxiety and changes in State anxiety (Tables 8, 9, 10, and 11 on pages 60, 62, and 63) in situations characterized by a physical danger such as in Non-controlled Aggressive Sports (Football, Wrestling, Hockey) in this study, is consistent with the stated Hypotheses 7, 8, and 9. It is also consistent with findings by others (Spielberger, 1966) and suggests that physical threats (violent physical contact and past injuries) do not elicit different levels of State anxiety in persons who differ in Trait anxiety. This is also consistent with a basic premise of State-Trait

Anxiety Theory which posits that Trait anxiety does not delineate individual differences in the disposition to experience A-State in situations characterized by threats of physical danger (Spielberger, 1972). This is quite contrary to the popular belief in athletics where it is believed that "Athletic contests in which physical contact is involved, produce greater anxiety than athletic contests in which there is no physical contact" (Tutko, 1971: 917), and that "Another factor that affects degree of anxiety is whether or not an athlete has been injured in his past athletic career" (Tutko, 1971: 917).

Effects of a Variety of University Sports and Playing Positions in Football on State Anxiety

A popular belief among leading sport psychologists, Cratty (1973: 166), Singer (1972: 125), and Oxedine (1970: 29), has been, although it has never been tested out systematically, that optimal performance of specific tasks are associated with different optimal State anxiety levels (see Figure 1, page 15). To test this generalization, the State anxiety scores which were associated only with Customary Level of Performance (Average or Expected and Outstanding Performance) were compared between a variety of sports at University level of competition and Positions played in Football. The statistical analysis revealed significant differences in Pre-Competitive Anxiety in the Ss of this study who were playing in a variety of University

sports (Table 13, page 65). However, Scheffe's Multiple Comparison Test could not locate the exact nature of this significance (for sports involved in the present study, refer to pages 33 and 34). No significant differences (Table 12 on page 64) were found between elevations in Pre-Competitive Anxiety in Ss playing in different Positions in Football (for categorization of Positions refer to page 34).

The nonsignificant finding of this study, indicating no differences in experiencing Pre-Competitive Anxiety in Football players who were playing different Positions, suggests that playing Positions in Football do not differentially affect State anxiety in players playing these positions. Thus, quite contrary to the popular belief, a quarterback (Group 2 in Figure 1 on page 15) could, for example, show similar elevations in Pre-Competitive Anxiety prior to a game, as a tackle or a blocker (Group 5 in Figure 1) or the field goal kicker (Group 1 in Figure 1) on the same football team. If differences did exist in experiencing Pre-Competitive Anxiety between positions, then the causes for these differences would have to be found elsewhere. It was shown earlier that Trait anxiety was one such factor. Thus, Oxedine's propositions regarding differential effects of playing positions on Pre-Competitive Anxiety in athletes whose playing assignment differed, does not hold for Ss in this study.

In this study, significant difference between six

sports was observed. However, because of small population in some sports and heterogeneity of variance, the exact nature of these differences could not be determined.

More research would have to be done on the effects of a variety of sport events on Pre-Competitive Anxiety in athletes participating in these sports before any conclusions could be drawn regarding these effects.

STATE ANXIETY - PERFORMANCE RELATIONSHIP

Up to this point, the discussion has dealt with eight independent variables, and with the first nine hypotheses. We propose now to focus, more particularly, on the eleventh hypothesis (on page 29) which concerned the possible nature of the relationship between the athlete's Customary Level of Pre-Competitive Anxiety and his Customary Level of Performance. On the basis of the statistical procedure used in this study it was found that for Ss in Senior High School Basketball competition the relationship between State anxiety and Playing performance was nonmonotonic and resembled an inverted U or a bell (see Figures 12 and 15 on pages 69 and 73). When this relationship was studied for Very High Mean A-Trait Ss and Very Low Mean A-Trait Ss, two similar, bell-shaped curves emerged at two different levels in the A-State scale continuum (Figure 12 on page 69). This observation is in agreement with Lampman's findings, namely, that "Individuals evidencing low anxiety in the non-competitive situation may perform better if their pre-meet anxiety is low", and, furthermore, that "Individuals

who are highly anxious in the non-competitive situation perform better if their pre-meet anxiety is high" (1966: 33). In apparent agreement with Lampman, the two curves on page 69, one for the Ss who were Very Low and the other for the Ss who were Very High on A-Trait, are allocated at different levels on Spielberger's A-State scale, thus delineating two similar in shape, but qualitatively different Performance - State anxiety relationships. The shaded areas under the curves are described by Customary Level of Pre-Competitive Anxiety and Customary Level of Performance which are different for the two groups. Customary Level of Pre-Competitive Anxiety for Very Low Mean A-Trait Ss ranged from 31 to 46 (see Appendix E, Table 21, A for exact information), whereas Customary Level of Precompetitive Anxiety for Very High Mean A-Trait Ss ranged from 40 to 59 on A-S te scale continuum. For Very Low Mean A-Trait Ss, a State anxiety score of 40 was on the average associated with an outstanding performance, whereas a score of 50 was required by Very High Mean A-State Ss for similar performance.

In search of greater predictive power, a similar analysis was carried out (for methodological details, see pages 70 and 74) for more extreme Ss on Overall Competitive Mean A-State (Figure 15 on page 73). It is interesting to note that the separation of the two bell-shaped curves was clarified to the point where the two curves were entirely separated.

The complete separation of the two curves in Figure 15 is an important finding and has empirical value for future investigations as a potentially useful research tool in predicting performance in athletics. It suggests that by obtaining a number of Pre-Competitive A-State scores for a S under consideration, this S could be classified to either one of the two curves on the basis of the calculated average from the obtained individual scores. Prediction of his performance then becomes a possibility, since the relationship between Customary Level of Pre-Competitive Anxiety and Customary Level of Performance has been established. However, it is unlikely that present technique will prove of practical value as a coaching tool because of the fact that repeated observations have to be obtained first before any predictions are made possible. This requires time and patience, which is in most cases not readily available to athletes and coaches.

STATE-TRAIT ANXIETY INVENTORY

In the present study, the STAI A-State scale successfully measured the presence and strength of State anxiety levels of athletes in non-stressful and stressful competitive athletic situations. This gave support to Hypothesis 10 which predicted that measures of State anxiety as assessed by State-Trait Anxiety Inventory (STAI) would successfully descriminate the anxiety levels of athletes in stressful and non-stressful competitive athletic situations.

When maintaining the conceptual distinction between State and Trait anxiety, STAI seems to be the only appropriate tool for research purposes, particularly in investigations similar to the present one, where measures of State anxiety were obtained repeatedly over longer periods of time with the same Ss. According to Levitt, "STAI is the most carefully developed instrument, from both theoretical and methodological standpoints" (1967: 71). Furthermore, the test construction procedures described by the originators (Spielberger, 1970) are highly sophisticated and rigorous. The validating data on the STAI presented by Spielberger et al (1970) are clearly in accord with Spielberger's conception of State-Trait Anxiety Theory as discussed in introductory chapter (see pages 4 and 5). Items contained in both scales have high item remainder correlations with the total scale. The test - retest correlations for the A-Trait scale are reported reasonably high, ranging from .73 to .86, while those for the A-State scale were reasonably low, ranging from .16 to .54. In the present study, the test - retest correlations for A-Trait scale ranged from .77 to .88, while those for the A-State scale ranged from .14 to .60. The low r's for the A-State scale were anticipated, "because a valid measure of A-State should reflect the influence of unique situational factors existing at the time of testing" (Spielberger et al, 1970). The reliability data of present study are thus in agreement with the reliability data provided by the

originators. The STAI A-State scale was designed to measure specific situational anxieties and as such it has proved to be very useful in studying Pre-Competitive Anxiety in athletes. Thus, Hypothesis 10 was confirmed.

V. SUMMARY AND CONCLUSIONS

The major goals of the present study were:

1. To investigate the effects of athletic competition on Pre-Competitive Anxiety of athletes who differed in Trait anxiety, performing in various sports, and

2. To examine the possible relationship between playing performance and Pre-Competitive Anxiety of basketball players.

An additional purpose of the study was to determine possible differences in the optimal Pre-Competitive Anxiety Level of the typical participant in football and a variety of university sport activities.

A conceptual framework for Pre-Competitive Anxiety within Spielberger's State-Trait Anxiety Theory was developed first. It was proposed to regard athletic competition as a set of stressor stimuli which evoke psychological and physical threats to athletes, thus creating Pre-Competitive Anxiety. These threats were found to have a specific athletic competition quality and were regarded as a function of the nature of a particular event. On the basis of the theoretical conceptualization of athletic Pre-Competitive Anxiety within Spielberger's theoretical model of State-Trait anxiety, a series of hypotheses were generated and subsequently tested to provide a better in-depth understanding of this pervasive phenomenon in athletic competition.

Secondly, a thorough theoretical examination of the relationships between Pre-Competitive Anxiety and athletic performance was carried out and expanded. A link between Customary Level of Pre-Competitive Anxiety and Customary Level of Performance for performing Ss was theoretically established on the basis of Duffy's activation theory which postulated an inverted U relationship between arousal and performance. Customary Level of Pre-Competitive Anxiety as demonstrated in athletes was additionally related to Spielberger's State anxiety phenomenon.

The Ss of the study were 641 athletes, participating in eight different sports on four different levels of competition: Junior and Senior High School, Alberta Juniors, and University. All Ss were repeatedly administered STAI A-State scale under two different experimental conditions: Stressful (Regular Season and Playoff competitive environments) and Non-stressful (Practice environment). The criterion for a stressful condition was that the A-State scale was administered approximately one half hour or less before the athletic competition. After every game, the performance of each S was assessed by their respective coaches on a three point scale (Poor, Average, Outstanding). Changes in Pre-Competitive Anxiety scores were then studied as a function of eight independent variables of the study: Experimental Conditions, Trait Anxiety, Skill Level, Level of Competition and Nature of Sport, Aggression Level, Injury History, Position Played in Football, and a variety of sport events.

at University level of competition. The major findings and conclusions of the study were:

1. In response to the psychological stress associated with athletic competition, State anxiety significantly increased in Ss at Junior and Senior High School levels of competition (Basketball and Football), Alberta Junior Football, and University Football. These significant rises in State anxiety were typically occurring between Practice and Regular Season conditions. Over the two stressful conditions, Regular Season and Playoff environments, State anxiety showed stability in these sports and levels of competition. Contrary to these observations, State anxiety in Ss in University Basketball showed significant rises between Regular Season and Playoffs, whereas Ss in University Hockey did not demonstrate any significant changes in State anxiety over the experimental conditions.

2. At Junior and Senior High School levels of competition and in University Basketball, High Trait Ss exhibited significantly higher State anxiety than Low Trait Ss in these sports over the experimental conditions.

3. No significant differences in State anxiety were found between Ss who were regular players (Starters) and Ss who were substituting the regulars (Non-starters) over the experimental conditions.

4. University Football players experienced significantly less State anxiety than Alberta Juniors and Junior High School players over the experimental conditions. A possibility existed that this significance was created by methodological differences in measuring State anxiety between these levels of competition.

5. Elevations in State anxiety experienced by athletes in Team Sports were not significantly different from elevations of State anxiety experienced by athletes in Individual Sports in stressful competitive environment.

6. Aggressive Sports and Injury History did not elicit different levels of Pre-Competitive Anxiety in Ss who differed in Trait anxiety.

7. No significant differences in Pre-Competitive Anxiety were found between football players who were assigned to different Positions in football.

8. A nonmonotonic State anxiety - Performance relationship was found for Senior High School Basketball players which resembled a bell or inverted U.

9. When the relationship between State anxiety and Performance in Senior High School Basketball was studied for Ss who differed on Trait anxiety, and Overall Competitive Mean State anxiety, two separate, similar in shape, but qualitatively different bell-shaped curves emerged which were allocated at different levels on the A-State scale continuum.

10. STAI A-State scale was successfully used in measuring the presence and strength of State anxiety levels of athletes in non-stessful and stressful competitive athletic situation

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APPENDIX A

EXPERIMENTAL DESIGN, SPORTS, LEVEL OF COMPETITION AND PARTICIPATING TEAMS

TABLE 15

EXPERIMENTAL DESIGN

	A	B	C	D	E	F
	Administration of A-Trait Inventory			Administration of A-State Inventory		
Sport and Level	Location	No. of Ss Tested	No. of Ss Retested	Experimental Period	Testing Days	Time of Day When Testing
Football Junior High	Classroom	77	22	Sept-Oct All Season	Wednesdays	Afternoons
Football Senior High	Classroom	190	64	Sept-Nov All Season; Playoffs	Thursdays and Fridays	Afternoons and Evenings
Football Alberta Junior	Locker Room	26	--	Sept-Oct 2nd Half; Playoffs	Thursdays and Fridays	Afternoons and Evenings
Football University	Locker Room	24	--	Sept-Oct All Season	Saturdays	Afternoons
Basketball Senior High	Classroom	145	33	Jan-March 2nd Half; Playoffs	Wednesdays and Fridays	Mornings and Evenings
Basketball University	Locker Room	7	--	Jan-Feb 2nd Half; Playoffs	Fridays and Saturdays	Afternoons and Evenings

TABLE 15 (Continued)

	A	B	C	D	E	F
	Administration of A-Trait Inventory			Administration of A-State Inventory		
Sport and Level	Location	No. of Ss Tested	No. of Ss Retested	Experimental Period	Testing Days	Time of Day When Testing
Hockey University	Locker Room	13	--	Jan-Feb 2nd Half; Playoffs	Fridays and Saturdays	Mornings and Evenings
Volleyball University	Locker Room	8	6	Jan-Feb 2nd Half	Fridays and Saturdays	Mornings
Fencing University	Fencing Gym	6	--	Feb-March All Season	Fridays and Saturdays	Mornings and Evenings
Gymnastics University	Gymnastics Gym	6	--	Jan-Feb All Season	Sundays	Afternoons
Wrestling University	Wrestling Gym	14	10	Jan-Feb All Season; Playoffs	Fridays and Saturdays	Mornings and Evenings
Cross-country Skiing University	Classroom	4	4	Jan-March All Season	Saturdays	Afternoons

TABLE 16

SPORTS, LEVEL OF COMPETITION AND PARTICIPATING TEAMS

SPORT AND LEVEL	NATURE OF COMPETITION	PARTICIPATING TEAMS
I. BASKETBALL		
1. University	a. Canada West Universities' Athletic Association	University of Alberta Golden Bears Basketball
	b. Canadian Intercollegiate Athletic Union National Playoff Tournament	
2. Senior High School	a. Edmonton High Schools' Boys' Basketball League	Public Schools: Bonnie Doon, Eastglenn, Jasper Place, M. E. Lazerte, McNally, Ross Sheppard, Strathcona, Victoria
	b. Alberta Schools' Athletic Association Provincial A Boys' Basketball Tournament	Separate Schools: Archbishop MacDonald, Louis St. Laurent, Archbishop O'Leary, St. Joseph, St. Mary, J. H. Picard
II. FOOTBALL		
1. University	Western Intercollegiate Football League	University of Alberta Golden Bears Football
2. Alberta Juniors	a. Alberta Junior Football League	Edmonton Huskies Football Club
	b. Western Canadian Junior Football Championships	

TABLE 16 (Continued)

SPORT AND LEVEL	NATURE OF COMPETITION	PARTICIPATING TEAMS
II. FOOTBALL (Continued)		
3. Senior High School	Edmonton High Schools' Football League (Seniors)	Public Schools: Bonnie Doon, M. E. Lazerte, Ross Sheppard, Strathcona, Harry Ainlay Separate Schools: Archbishop O'Leary, Louis St. Laurent
4. Junior High School	Edmonton High Schools' Football League (Juniors)	Public Schools: Strathcona Separate Schools: Archbishop MacDonald, Archbishop O'Leary
III. HOCKEY		
1. University	Canada West Universities' Athletic Association	University of Alberta, Golden Bears Hockey
IV. VOLLEYBALL		
1. University	Canada West Universities' Athletic Association	University of Alberta Golden Bears Volleyball
V. WRESTLING		
1. University	a. Canada West Universities' Athletic Association b. Exhibition Tournaments (Amateur and Collegiate Competition)	University of Alberta Golden Bears Wrestling

TABLE 16 (Continued)

SPORT AND LEVEL	NATURE OF COMPETITION	PARTICIPATING TEAMS
VI. GYMNASTICS		
1. University	a. Canada West Universities' Athletic Association b. Collegiate Exhibition Tournaments	University of Alberta Golden Bears Gymnastics
VII. FENCING		
1. University	a. Canada West Universities' Athletic Association b. Exhibition Tournaments	University of Alberta Golden Blades Fencing
VIII. CROSS-COUNTRY SKIING		
1. University	a. Alberta Provincial Championships b. Alberta Amateur Races	University of Alberta Golden Bears Cross-Country Skiing

APPENDIX B

STATE - TRAIT ANXIETY INVENTORY

YOUR SELF-EVALUATION QUESTIONNAIRE

HOW DO YOU GENERALLY FEEL

NAME _____ NUMBER OF YEARS IN COMPETITION ____ ANY PREVIOUS ATHLETIC INJURY (DESCRIBE)_____

SPORT _____ AGE _____

DIRECTIONS: Mark the answer which seems to describe your general feelings best.

		ALMOST NEVER	SOME-TIMES	OFTEN	ALMOST ALWAYS
1.	I feel pleasant				
2.	I tire quickly.				
3.	I feel like crying.				
4.	I wish I could be as happy as others seem to be				
5.	I am losing out on things because I can't make up my mind soon enough				
6.	I feel rested				
7.	I am "calm, cool and collected"				
8.	I feel that difficulties are piling up so that I cannot overcome them				
9.	I worry too much over something that really doesn't matter				
10.	I am happy.				
11.	I am inclined to take things hard				
12.	I lack self-confidence.				
13.	I feel secure				
14.	I try to avoid facing a crisis or difficulty.				
15.	I feel blue				
16.	I am content.				
17.	Some unimportant thought runs through my mind and bothers me.				
18.	I take disappointments so keenly that I can't put them out of my mind				
19.	I am a steady person.				
20.	I get in a state of tension or turmoil as I think over my recent concerns and interests . .				

YOUR SELF-EVALUATION QUESTIONNAIRE

HOW DO YOU FEEL RIGHT NOW

NAME _____ NUMBER OF MINUTES/HOURS PRIOR TO COMPETITION _____ DATE _____

DIRECTIONS: Mark the answer which seems to describe your present feelings best --- YOUR FEELINGS AT THIS VERY MOMENT.

1.	I feel calm	not at all	somewhat	moderately so	very much so
2.	I feel secure	not at all	somewhat	moderately so	very much so
3.	I am tense.	not at all	somewhat	moderately so	very much so
4.	I am regretful	not at all	somewhat	moderately so	very much so
5.	I feel at ease.	not at all	somewhat	moderately so	very much so
6.	I feel upset.	not at all	somewhat	moderately so	very much so
7.	I am presently worrying over possible misfortunes.	not at all	somewhat	moderately so	very much so
8.	I feel rested	not at all	somewhat	moderately so	very much so
9.	I feel anxious.	not at all	somewhat	moderately so	very much so
10.	I feel comfortable.	not at all	somewhat	moderately so	very much so
11.	I feel self-confident	not at all	somewhat	moderately so	very much so
12.	I feel nervous.	not at all	somewhat	moderately so	very much so
13.	I am jittery.	not at all	somewhat	moderately so	very much so
14.	I feel high strung.	not at all	somewhat	moderately so	very much so
15.	I am relaxed.	not at all	somewhat	moderately so	very much so
16.	I feel content.	not at all	somewhat	moderately so	very much so
17.	I am worried.	not at all	somewhat	moderately so	very much so
18.	I feel over-excited and "rattled" . .	not at all	somewhat	moderately so	very much so
19.	I feel joyful	not at all	somewhat	moderately so	very much so
20.	I feel pleasant	not at all	somewhat	moderately so	very much so

APPENDIX C

COACH'S PERFORMANCE EVALUATION QUESTIONNAIRE

COACH'S PERFORMANCE EVALUATION QUESTIONNAIRE

NAME OF ATHLETE _____

	POOR	AVERAGE OR AS EXPECTED	OUTSTANDING
HOW WAS HIS PERFORMANCE . . .	(-1)	(0)	(+1)

APPENDIX D

MEAN A-STATE VALUES

TABLE 17

MEAN A-STATE VALUES FOR HIGH A-TRAIT SUBJECTS AND LOW A-TRAIT SUBJECTS IN FOOTBALL, BASKETBALL, AND HOCKEY AS A FUNCTION OF THE EXPERIMENTAL CONDITIONS AT DIFFERENT LEVELS OF COMPETITION

Level and Sport	A-Trait	Practice	Regular Season	Playoffs
Junior High School Football	HIGH	37.2	49.4	
	LOW	29.0	43.5	
Senior High School Football	HIGH	35.4	50.3	51.5
	LOW	30.5	45.1	45.2
Alberta Junior Football	HIGH	39.8	49.0	49.0
	LOW	36.4	47.4	44.3
University Football	HIGH	29.4	40.9	
	LOW	25.0	41.3	
Senior High School Basketball	HIGH	38.1	47.2	47.8
	LOW	30.3	39.6	40.8
University Hockey	HIGH	40.8	40.9	41.7
	LOW	35.8	37.9	36.2

TABLE 18

MEAN A-STATE VALUES FOR STARTERS AND NON-STARTERS IN FOOTBALL AND BASKETBALL AS A FUNCTION OF THE EXPERIMENTAL CONDITIONS AT DIFFERENT LEVELS OF COMPETITION

Level and Sport	Starters Non-starters	Practice	Regular Season	Playoffs
Junior High School Football	STARTERS	33.2	47.4	
	NON-STARTERS	31.9	43.9	
Senior High School Football	STARTERS	32.7	48.3	48.8
	NON-STARTERS	32.8	46.0	45.0
Alberta Junior Football	STARTERS	37.3	49.8	48.2
	NON-STARTERS	38.6	45.9	44.9
University Football	STARTERS	27.6	39.7	
	NON-STARTERS	30.0	43.5	
Senior High School Basketball	STARTERS	33.5	44.6	45.7
	NON-STARTERS	34.8	41.7	41.7

TABLE 19

MEAN A-STATE VALUES IN FOOTBALL AND BASKETBALL AS A FUNCTION OF THE EXPERIMENTAL CONDITIONS AT DIFFERENT LEVELS OF COMPETITION

Level and Sport	Practice	Regular Season	Playoffs
FOOTBALL			
Junior High School	32.5	45.7	
Senior High School	32.7	47.1	46.9
Alberta Junior	37.9	47.9	46.6
University	28.8	41.6	
BASKETBALL			
Senior High School	34.1	43.3	43.9
University	38.7	40.1	50.1

TABLE 20

OVERALL COMPETITIVE MEAN A-STATE VALUES AS A FUNCTION OF A-TRAIT IN UNIVERSITY TEAM SPORTS AT DIFFERENT LEVELS OF AGGRESSION

A-Trait	Non Aggressive Sports	Controlled Aggressive Sports	Non-controlled Aggressive Sports
LOW A-TRAIT	35.8	37.1	38.3
HIGH A-TRAIT	41.3	42.4	40.7

APPENDIX E

MEANS, STANDARD DEVIATIONS, AND NUMBER OF RESPONSES OF A-STATE SCORES ASSOCIATED WITH THREE LEVELS OF PERFORMANCE IN SENIOR HIGH SCHOOL BASKETBALL

TABLE 21

A. MEANS, STANDARD DEVIATIONS, AND NUMBER OF A-STATE RESPONSES ASSOCIATED WITH THREE LEVELS OF PERFORMANCE FOR Ss VERY LOW AND VERY HIGH ON MEAN A-TRAIT

	VERY LOW			VERY HIGH		
Performance	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Poor 1	29.6	5.60	10	37.3	5.99	12
Average 1	31.9	5.03	31	42.2	4.58	13
Outstanding	40.8	5.16	18	50.1	7.27	14
Average 2	46.4	4.34	17	59.0	5.42	18
Poor 2	55.4	12.33	5	60.3	4.00	10

B. MEANS, STANDARD DEVIATIONS, AND NUMBER OF A-STATE RESPONSES ASSOCIATED WITH THREE LEVELS OF PERFORMANCE FOR Ss VERY LOW AND VERY HIGH ON OVERALL COMPETITIVE MEAN A-STATE

	VERY LOW			VERY HIGH		
Performance	Mean	Std. Dev.	N	Mean	Std. Dev.	N
Poor 1	23.3	1.37	6	44.9	9.80	7
Average 1	27.1	2.27	25	54.0	3.42	14
Outstanding	31.6	4.97	14	59.6	4.23	11
Average 2	35.5	3.57	25	64.3	4.98	15

APPENDIX F

REPORTED INJURIES

SERIOUS PAST ATHLETIC INJURIES AS REPORTED BY FOOTBALL PLAYERS ON DIFFERENT LEVELS OF COMPETITION

1. Junior High School

Bruised cracked ribs; broken tow; broken ankle, jammed elbow; broken finger; broken finger twice; separated ribs; broken ankle; broken leg; broken thumb.

2. Senior High School

Broken ankle; broken finger, broken nose, pulled ligaments; broken cheekbone; broken thumb, torn ligaments; dislocated elbow; compressed disc in lower back; broken tooth; broken ankle, sprained knee, torn knee ligaments; cracked nose, broken toe; broken collar bone; cracked hand; fractured foot bone; head injury - unconscious; broken finger, jaw, ankle; dislocated finger, broken finger; broken leg.

3. Alberta Junior

Inverted ankle; fractured finger; torn knee ligaments; dislocated elbow; broken wrist, hand, elbow, foot, ankle, leg; torn knee ligaments, separated shoulder, bruised disc, torn muscles both thighs; shoulder separation; cracked scapula bone, separated shoulder, stretched ligaments in ankle; two broken bones in hand; two broken fingers, broken scapula; broken ankle, broken nose, torn knee ligaments, dislocated fingers, broken hand; torn knee ligaments; broken wrist; separated right shoulder.

4. University

Broken arm, broken nose; separated shoulder; damaged vertibrae; dislocated elbow; knee operation cartilage; broken arm, leg, cracked rib, broken foot; sprained both ankles.